

Bulletin No. 159  
Issue 2  
August, 1942

# TELETYPE

PRINTING TELEGRAPH SYSTEMS

## ADJUSTMENTS TYPE WHEEL PAGE PRINTER (MODEL 26)



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ADJUSTMENTS OF THE TYPE WHEEL PAGE PRINTER (MODEL 26)

The following adjustments are arranged in a sequence that would be followed if a complete readjustment of the printer were undertaken. This fact should be kept in mind when a single adjustment is to be made.

The spring tension values given in this bulletin were derived from measurements made with Teletype spring scales. These scales are calibrated for use in a vertical "pull" position. When used in any other position, the reading is an indicated value. Therefore, in order to obtain the proper spring value readings, the spring scales which are included in the Teletype printer catalog tool list should be used.

NOTE: In all the figures of this bulletin, fixed pivot points are designated by solid black circles.

TYPING UNIT ADJUSTMENTS

Armature Lever Pivot Screw Adjustment (Figure 2) - See Note (A)

With the armature lever spring and the selector arm spring unhooked, the armature lever should be free on its pivots with barely perceptible end play.

Adjust by means of the upper pivot screw.

Selector Magnet Adjustment (Figure 3) - See Notes (A) and (B)

The armature should touch the magnet cores at approximately the centers of their pole faces; the cores should be centrally located with respect to the armature.

To check, remove the selector magnet bracket; hold the cores approximately vertically so that the armature rests against the pole faces by its own weight. Observe the points of contact by holding a bright background behind the magnet bracket assembly.

To adjust, loosen the selector magnet bracket mounting screws and position the magnet cores; then tighten the mounting screws.

Replace the selector magnet bracket.

NOTE: When the cores are in proper adjustment, it should require at least 3-1/2 lbs. applied at right angles to the armature edge midway between the cores, to separate the armature from the cores when a current of .020 ampere is flowing in the circuit.

\* \* \*

- (A) These requirements should be checked with the ribbon feed assembly and range finder assembly removed.
- (B) This requirement should be checked with the selector magnet bracket removed.

NOTE: After making a single adjustment, check related adjustments.

Selector Arm Pivot Screw Adjustment (Figures 4 & 5) - See Note (A)

With the armature lever spring, the selector arm spring, and selector arm stop detent spring unhooked, the selector arm should be free on its pivot with barely perceptible end play, and the locking lever should overtravel the top and bottom edges of the locking wedge. There should also be a minimum clearance of .008" between the selector arm and the armature lever, and a minimum clearance of .010" between the selector arm and the selector arm stop detent when the play in the detent is taken up in a direction to make this clearance a minimum.

The end play may be adjusted by means of the upper pivot screw. If the minimum clearance requirements are not met, it will be necessary to remove the selector magnet bracket and the selector arm bracket and adjust both pivot screws of the selector arm.

Selector Arm Bracket Adjustment (Figure 2) - See Note (A)

The position of the selector arm bracket should be such as to provide some clearance, not more than .040", between each sword and either stop post, under the following conditions:

Remove the locking lever spring, the armature lever spring, and the selector arm spring. Rotate the main shaft until the No. 1 selector lever is resting on the peak of its cam. With the selector arm in its unoperated (spacing) position, move the spacing arm of the No. 1 sword against the selector arm extension. Then rotate the selector arm slowly toward the marking position until the selector arm just leaves the spacing arm of the No. 1 sword. There should be some clearance, not more than .040", between the No. 1 sword and the spacing stop post.

Unhook the armature lever spring at the spring arm, and with the selector arm in its operated (marking) position, move the marking arm of the No. 1 sword against the selector arm extension. Then rotate the selector arm slowly toward the spacing position until the selector arm just leaves the marking arm of the No. 1 sword. There should be some clearance, not more than .040", between No. 1 sword and the marking stop post.

With each selector lever on the peak of its cam, each associated sword should be tried for the foregoing requirement of some clearance, not more than .040".

To adjust, loosen the selector arm bracket mounting screws just enough to make the bracket friction tight. Then, to equalize the clearance between the swords and the stop posts, loosen the centralizing eccentric screw lock nut and turn the eccentric screw clockwise to provide more clearance on the spacing side or counterclockwise to provide more clearance on the marking side.

NOTE: Be sure that the selector arm stop detent does not interfere with the adjustment.

\* \* \*

(A) These requirements should be checked with the ribbon feed assembly and range finder assembly removed.

NOTE: After making a single adjustment, check related adjustments.

The centralizing eccentric screw should always be located so that its indicating line is adjacent to the marked scale that has been provided on the bracket to aid in gauging the amount the screw must be turned. Tighten the lock nut when the selector arm has been centralized.

To obtain the "some clearance, not more than .040"," requirement between the swords and the stop posts, insert the 90783 adjusting wrench in one of the two holes provided and turn the wrench to move the bracket closer to or farther from the swords as required. Then tighten the selector arm bracket mounting screws.

Replace the locking lever spring, selector arm spring, and armature lever spring.

Locking wedge Adjustment (Figure 6) - See Note (A)

With the locking lever on a high part of its cam, the right end of the locking wedge should clear the locking lever by .006" to .010" when the end of wedge is held in line with the locking lever.

To adjust, loosen the locking wedge mounting screw and position the locking wedge in its guide; then tighten the mounting screw.

Locking Lever Spring Tension (Figure 6) - See Note (A)

With the locking lever on the high part of its cam, hook an 8 oz. scale on the end of the locking lever, at the spring hole, and pull in line with the spring. It should require from 4 to 5-1/2 ozs. to start the lever moving away from the cam.

Selector Arm Stop Detent Adjustment (Figure 4) - See Note (A)

With the locking lever on the low part of its cam, there should be an equal amount of clearance between the sides of the locking wedge and the locking lever when the selector arm is in the marking or spacing position.

NOTE: When checking the marking position, be sure that the selector arm operating screw does not interfere with the movement of the selector arm.

To adjust, loosen the screw that mounts the selector arm stop detent eccentric post just enough to make the post friction tight.

Position the stop detent by turning the post; then tighten the post mounting screw.

Selector Arm Stop Detent Spring Tension (Figure 4) - See Note (A)

Unhook the stop detent spring from the locking lever guide and hook an 8 oz. scale in the spring eye. It should require 4 to 5 ozs. to pull the spring to its position length.

\* \* \*

(A) These requirements should be checked with the ribbon feed assembly and range finder assembly removed.

NOTE: After making a single adjustment, check related adjustments.

Selector Lever Spring Tension (Figure 6) - See Note (A)

With the selector levers in their unoperated position, unhook the selector lever springs from their spring posts and hook a 32 oz. scale in the spring eye of each spring. It should require 20 to 24 ozs. to pull each spring to its position length. Rehook the springs.

Selector Magnet Bracket Position Adjustment (Figure 7) - See Note (A)

Rotate the selector cam sleeve until the locking lever just drops off the high part of its cam; then rotate the cam sleeve backward until the rotation is stopped by the locking lever. With the selector arm locked in its marking position, there should be a clearance of .060" to .065" between the armature lever and the face of a tooth on the armature lever cam.

To adjust, loosen the selector magnet bracket mounting screws and the selector magnet bracket adjusting arm mounting screws just enough to make the bracket and adjusting arm friction tight. Then position the selector magnet bracket by means of the adjusting arm using the 90783 adjusting wrench. To do this, insert the adjusting wrench in the hole above the end of the adjusting arm and rotate the wrench.

Tighten the bracket and adjusting arm mounting screws.

Selector Magnet Bracket Adjustment (Figures 3-A & B) - See Note (A)

With the selector magnet energized, the clearance between the selector arm operating screw and the selector arm should be .004" to .006" greater when the armature lever is on a peak of its cam than when the armature lever is opposite an indent on the cam.

To adjust, energize the magnet and rotate the selector cam sleeve until the armature lever is resting on a peak of the armature cam. Holding the cam sleeve in this position, turn the main shaft to a point where it moves the armature lever the greatest distance. Loosen the selector magnet bracket mounting screws and, by means of its adjusting screw, rotate the selector magnet bracket so that the armature just touches the pole faces; then turn the adjusting screw an additional one-tenth of a turn counterclockwise. This will press the armature firmly against the magnet cores. (While making the one-tenth of a turn adjustment, be careful to avoid lost motion due to loose fitting screw threads.) Measure the clearance between the selector arm operating screw and the selector arm and if there is no clearance, back off the selector arm operating screw to provide at least .006". Then rotate the selector cam sleeve so that the armature lever is opposite an indent of its cam and again measure the clearance between the selector arm operating screw and the selector arm. If the difference in the two clearances exceeds .006", the selector magnet bracket adjusting screw should be turned clockwise. If the difference in the clearance is less than .004", turn the screw counterclockwise. Tighten the selector magnet bracket mounting screws.

\* \* \*

(A) These requirements should be checked with the ribbon feed assembly and range finder assembly removed.

NOTE: After making a single adjustment, check related adjustments.

Armature Lever Spring Tension Adjustment (Figure 3)

Unhook the armature lever spring from its spring arm and rotate the main shaft until the armature lever is on a high part of its cam. With a 32 oz. scale hooked in the spring eye, it should require 13 to 15 ozs. to pull the spring to position length when the selector magnet coils are wired in parallel (1) to 24 ozs. when coils are hooked in series).

To obtain the proper tension, loosen the spring arm mounting nut and position the arm; then tighten the mounting nut.

Rehook the armature spring.

Selector Arm Operating Screw Adjustment (Figure 8) - See Note (A)

With the selector magnet energized and the selector cam sleeve rotated so that the armature lever is opposite an indent of its cam, there should be a clearance of .003" to .006" between the selector arm operating screw and the selector arm.

To adjust, loosen the selector arm operating screw lock nut and position the screw; then tighten the lock nut.

Selector Arm Spring Tension (Figure 9) - See Note (A)

Unhook the selector arm stop detent spring. With the armature lever on a high part of its cam, hook an 8 oz. scale over the end of the locking wedge and pull parallel to the selector arm spring. It should require 1-1/4 to 1-3/4 ozs. to start the selector arm moving.

Replace the detent spring.

Stop Lever Eccentric Screw Adjustment (Figure 10) - See Note (A)

The stop lever, on the range finder assembly, should overtravel the latching face of the trip latch by .004" to .006".

To adjust, loosen the stop lever eccentric screw nut and position the screw; then tighten the nut, making certain that the tightening of the nut does not disturb the adjustment.

Trip Latch Spring Compression (Figure 10) - See Note (A)

NOTE: When measuring this requirement, the range finder assembly should be held in a horizontal position.

Apply the push end of an 8 oz. scale, held in a vertical position, to the trip latch, as near to the stop lever as possible. It should require 1 to 1-1/2 ozs., when pushing upward, to start the trip latch moving.

\* \* \*

(A) These requirements should be checked with the ribbon feed assembly and range finder assembly removed.

NOTE: After making a single adjustment, check related adjustments.

Stop Lever Spring Tension (Figure 11) - See Note (A)

NOTE: Be sure that the stop lever eccentric has been adjusted before checking this requirement.

With the trip latch plunger held operated, hook an 8 oz. scale on the end of the stop lever of the range finder assembly, and pull horizontally at right angles to the stop lever. It should require 3/4 to 1-1/4 ozs. to start the lever moving.

**REPLACE THE RANGE FINDER ASSEMBLY**

Trip-Off Screw Adjustment (Figure 12)

There should be some clearance, not more than .002", between the stop lever and the trip latch when the armature is in the unoperated position and the selector cam sleeve is rotated until the stopping edge of the stop lever is directly below the latching surface of the trip latch.

The trip latch plunger should have at least .002" end play (See Figure 10) when the armature is held in the attracted position and with the stop lever clear of the latching surface of the trip latch.

To adjust, loosen the trip-off screw lock nut and position the screw to meet the first requirement. The latter requirement serves as a check on the trip-off screw adjustment and also on the adjustment of the selector magnet bracket.

Type Wheel Stop Pin Spring Tension (Figure 13)

(a) Apply an 8 oz. scale to each unselected stop pin and pull or push, horizontally, in line with each pin slot. It should require not more than 6 ozs. to start each pin moving.

(b) In a similar manner, measure the tension of each stop pin spring when the stop pin is in its selected position. This tension should be not less than 2 ozs.

Stop Arm Latch Spring Tension (Figure 13)

Hook an 8 oz. scale under the end of the latch, on the type wheel shaft stop arm, and pull upward. It should require 2 to 4 ozs. to start the latch moving.

REMOVE THE TYPE WHEEL LIFTING BAIL YIELD SPRING AND RETURN SPRING, THE PRINTING ARM SPRING, THE LIFTING BAIL SHAFT, AND THE TWO SCREWS WHICH HOLD THE FRONT SHAFT ASSEMBLY TO THE CASTING. REMOVE THE FRONT SHAFT ASSEMBLY AND THE LIFTING BAIL. WHEN REMOVING THE LIFTING BAIL, CARE SHOULD BE TAKEN NOT TO LOSE THE ROLLER OR WICK ON THE LOWER ARM. SEE FIGURES 31 and 34.

\* \* \*

(A) These requirements should be checked with the ribbon feed assembly and range finder assembly removed.

NOTE: After making a single adjustment, check related adjustments.

#### Main Shaft Adjustment (Figure 14)

When the main shaft is rotated, the selector cams on the selector cam sleeve should line up with their respective selector levers.

To adjust, add or remove shims between the lower bearing and the shoulder on the main shaft.

#### Function Bail Shaft Adjustment (Figure 15)

The function bail should have some end play, not more than .006".

To adjust, loosen the function bail shaft clamp screw and the lock nut on the function bail shaft. Turn the shaft to the right or left; then tighten the lock nut and clamp screw.

#### Function Bail Shaft Bracket Adjustment (Figure 15)

With the operating cam assembly in its stopped position, there should be .014" to .015" clearance between the top surface of the operating cam roller and the lower surface of the shoulder of its stub, when the roller is against the horizontal surface of the cam. This clearance should be checked when the end play of the operating cam assembly is taken up in a direction to make the clearance a minimum.

To adjust, loosen the function bail shaft bracket mounting screws and position the bracket by means of its elongated mounting holes. Tighten the mounting screws.

NOTE: While the mounting screws are being tightened, the play between the bail bracket and both screws should be taken up by moving the bracket toward the front of the printer.

#### Main Shaft Clutch Throw-Out Lever Adjustment (Figure 14)

There should be .010" to .018" clearance between the clutch teeth when the clutch is fully disengaged.

To adjust, loosen the clutch throw-out lever bracket mounting screws and position the bracket by means of its elongated mounting holes; then tighten the mounting screws.

#### Main Shaft Clutch Throw-Out Lever Spring Tension (Figure 16)

With the clutch throw-out lever on the low part of the driven member, hook an 8 oz. scale over the clutch throw-out lever, just alongside the driving clutch member and pull at right angles to the lever. It should require 3 to 6 ozs. to start the lever moving.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

### Front and Main Shaft Clutch Spring Tension (Figure 16)

NOTE: The tension of these springs should not be checked unless there is reason to believe the tension is incorrect. To check the tensions of these springs, it will be necessary to remove them.

With a 12 lb. scale applied to a small disc, such as a coin, on top of the spring, it should require 1-1/4 to 1-1/2 lbs. to compress each spring to a length of 3/8".

### Function Pawl Guide Plate Adjustment

The function pawls should be aligned with their latches and all levers guided by the guide plate should be free in their slots.

To adjust, position the function pawl guide plate (Figure 17) by means of its mounting screws.

### Function Lever Backstop Adjustment (Figure 17)

Rotate the main shaft until the unselected function pawls overtravel the function pawl latches by approximately 1/16". Under this condition there should be a clearance of .015" to .050" between the function pawls and the function pawl latches.

To adjust, loosen the function lever backstop mounting screws and position the backstop; then tighten the mounting screws.

### Function Lever Stud Adjustment

The levers mounted on the function lever stud should move freely without binding when their springs are unhooked. See Figure 17 for location of parts.

To adjust, tighten the lower nut securely, then back it off one-third turn and lock it in position by means of the upper nut.

### Function Pawl Latch Spring Tension (Figure 17)

Unhook the upper function pawl latch spring at its spring post and hook a 32 oz. scale in the spring eye. It should require 6 to 9 ozs. to pull the spring to its position length. Check the other function pawl latch springs in the same manner. Rehook the springs.

NOTE: The foregoing requirement does not apply to the signal bell pawl latch spring.

### Signal Bell Pawl Latch Spring Tension

Unhook the signal bell pawl latch spring from its spring post and hook a 64 oz. scale in the spring eye. It should require 24 to 36 ozs. to extend the spring to its operating position length.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

Function Pawl Auxiliary Latch Spring Tension (Figure 18)

With the main shaft cam sleeve in its stop position, hook an 8 oz. scale over the end of the upper auxiliary latch, at the spring hole, and pull in line with the spring. It should require 4 to 6 ozs. to start the auxiliary latches moving.

Function Pawl Latch Eccentric Stop Post Adjustment (Figure 18)

With the upper function pawl moved to the right until its latching surface is in line with the latching surface of the upper function pawl latch, rotate the main shaft until the clearance between the end of the upper function pawl and the projection on the upper function pawl latch is at the maximum. Under this condition the clearance should be .010" to .025". Check the other five function pawls and latches for the same amount of clearance.

To adjust, loosen the function pawl latch eccentric stop post lock nut and position the post; then tighten the lock nut.

Function Pawl Spring Tension (Figure 18)

With the main shaft cam sleeve in its stop position, hook an 8 oz. scale over the end of the upper function pawl, at the spring hole, and pull as shown on the figure. It should require 2 to 4 ozs. to start the pawl moving. Check the other function pawl springs for the same requirement.

Spacing Pawl Latch Stop Adjustment (Figure 19)

Rotate the main shaft cam sleeve until the clearance between the end of the spacing pawl and its latch is a maximum. Move the spacing pawl to the left (viewing the printer from the rear) until its latching surface is in line with the latching surface of the latch. Under this condition there should be a clearance of .010" to .030" between the end of the spacing pawl and its latch.

To adjust, loosen the spacing pawl latch stop lock nut and position the stop; then tighten the nuts.

Spacing Pawl Spring Tension (Figure 19)

With the main shaft cam sleeve in its stop position, hook an 8 oz. scale over the spacing pawl, just to the rear of the spring hole, and pull in line with the spring. It should require 3 to 5 ozs. to start the pawl moving.

Spacing Pawl Yield Spring Tension (Figure 19)

With the main shaft cam sleeve in its stop position, hook a 64 oz. scale over the shoulder of the spacing pawl and pull in line with the spring. It should require 48 to 60 ozs. to start the pawl moving.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

#### Spacing Pawl Latch Spring Tension (Figure 19)

With the main shaft cam sleeve in its stop position, hook an 8 oz. scale over the end of the spacing pawl latch, near the end of the spacing pawl, and pull at right angles to the surface on which the scale is hooked. It should require 1-1/2 to 2-1/2 oza. to start the latch moving.

#### Operating Bail Cam Roller Arm Adjustment (Figure 21)

Rotate the main shaft until the operating bail cam roller is on the low part of its cam. Under this condition there should be a clearance of .010" to .025" between any function arm and its respective function lever when the play of the parts is taken up so as to make the clearance a maximum. Check all function levers by unlatching the type wheel stop arm and rotating the function arm assembly.

To adjust, loosen the roller arm clamping screw and position the arm; then tighten the clamping screw.

#### Carriage Return Lever Latch Mounting Post Adjustment (Figure 21)

Latch the carriage return lever and hold the carriage return release lever out of the path of the carriage return release lever link. Select any character, other than a function, and rotate the main shaft until the clearance between the spacing pawl and the teeth on the spacing ratchet is at a minimum. Under this condition the spacing pawl should clear the teeth on the spacing ratchet by .010" to .020".

To adjust, loosen the carriage return lever latch mounting post lock nut and position the post; then tighten the lock nut.

#### Spacing Rack Adjustment (Figure 22)

There should be a minimum amount of backlash, without binding, between the spacing rack and the spacing gear teeth, throughout the entire travel of the carriage.

To adjust, loosen the spacing rack mounting screws and position the rack; then tighten the mounting screws.

#### Space Retaining Pawl Adjustment (Figure 23)

(a) With the type wheel stop arm latched on a character stop pin, rotate the main shaft until the function bail roller is on the high part of its cam. Under this condition, a tooth on the spacing ratchet should overtravel the space retaining pawl by .010" to .025".

(b) With the conditions set up, according to paragraph (a), latch the carriage return lever and rotate the spacing shaft. The space retaining pawl should then clear the teeth on the spacing ratchet by .020" to .030".

To adjust, loosen the space retaining pawl clamping screws and position the pawl to meet both requirements; then tighten the screws.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

#### Space Retaining Pawl Spring Tension (Figure 23-9)

With the carriage return lever latched, hook an 8 oz. scale over the end of the space retaining pawl, at the spring hole, and pull in line with the spring. It should require 6 to 8 ozs. to start the pawl moving.

#### Carriage Return Lever Spring Tension (Figure 24)

With the main shaft cam sleeve in its stop position, hold the spacing pawl, space retaining pawl, and the carriage return lever latch out of engagement with the carriage return lever. Hook an 8 oz. scale in the notch at the end of the carriage return lever and pull away from the latch. It should require 1 to 3 ozs. to start the lever moving.

#### Carriage Return Release Lever Spring Tension (Figure 24)

Hook an 8 oz. scale over the carriage return release lever, at the spring hole, and pull in line with its spring. It should require 3/4 to 2 ozs. to start the lever moving.

#### Function Intermediate Lever Return Spring Tension (Figure 17)

To check the tension of these springs, it will be necessary to remove them.

With one of the spring eyes hooked on a stationary point, hook an 8 oz. scale in the other spring eye. It should require 6 to 8 ozs. to stretch each spring to a length of  $1\frac{1}{4}$ ".

#### Function Intermediate Lever Yield Spring Tension (Figure 17)

To check the tension of these springs, it will be necessary to remove them.

With one of the spring eyes hooked on a stationary point, hook a 32 oz. scale in the other spring eye. It should require 13 to 15 ozs. to stretch each spring to a length of  $\frac{5}{8}$ ".

#### Transfer Bail Adjustment (Figure 25)

(a, Each transfer bail yield spring should line up with its respective selector lever.

(b, The transfer bail should have some end play, not more than .006".

To obtain the above requirements, adjust the transfer bail by positioning the two collars on the shaft. The lower collar should be used to align the yield springs with the selector levers and the upper collar for the end play adjustment.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

#### Code Disc Lever Stud Shims Adjustment

The code disc levers should overlap their corresponding code discs.

The position of the code disc lever stud may be regulated by means of shims placed between the shoulder of the stud and the stud mounting plate. See Figure 26 for location of parts.

#### Code Disc Lever Stud Mounting Plate Adjustment (Figure 26)

Set up the letter "A" combination on the sworus. Then perform the transfer operation manually, holding the transfer bail firmly in its operated position (do not jam). Under this condition, at least one of the code discs should be moved clockwise against its stop and at least one should be moved counterclockwise against its stop.

**NOTE:** The above requirement may be checked by trying to move the transfer levers to the left and right, being careful not to spring the linkages between the transfer levers and the code discs. When a code disc is against its stop, there should be no perceptible play in the corresponding transfer lever.

To adjust, loosen the code disc lever stud mounting plate mounting screws and position the plate; then tighten the mounting screws.

#### Transfer Yield Spring Tension (Figure 26)

Rotate the motor flywheel until No. 1 selector lever is on the peak of its cam. Then with the long end of the yield spring against its selector lever, apply the push end of a 12 lb. scale to the spring retainer upper mounting screw and push toward the main shaft at right angles to the spring. It should require a pressure of 3-1/2 to 5-1/2 lbs. to start flexing the spring. Repeat this check with No. 2, 3, 4, and 5 selector levers on the peak of their cams.

#### Front shaft Clutch Throw-out Lever and Play adjustment (Figure 27-a)

The front shaft clutch throw-out lever should have some end play, not more than .004".

Adjust by means of shims under the head of the lower shoulder screw.

#### Lifting Bail Lower Cam Follower Arm Stud Adjustment

The oil wick slot in the lower cam follower arm stud of the lifting bail should line up with the oil wick retaining hole in the arm.

To adjust, loosen the stud lock nut and position the stud; then tighten the lock nut.

REPLACE THE TYPE "A" LIFTING BAIL, MAKING CERTAIN THAT THE OIL WICK IS IN THE SLOT OF THE STUD AND THOUGH THE RETAINING HOLE IN THE ARM AND THAT THE ROLLER IS ON THE STUD. REPLACE THE FRONT START WEIGHT, THE LIFTING BAIL RETURN SPRING AND YIELD SPRING, AND THE LIFTING CAM FOLLOWER ARM STUD.

\* \* \*

**NOTE:** After making a single adjustment, check related adjustments.

### Front shaft assembly Bracket Adjustment (Figure 27)

There should be a minimum amount of backlash without binding between the front shaft gear and the main shaft gear during a complete revolution of the gears.

To adjust, add or remove shims between the front shaft bracket and the casting.

### Main shaft clutch Throw-out Lever Arm Adjustment (Figure 14-B)

When the main shaft clutch throw-out lever is on the high part of the clutch throw-out lever cam on the front shaft, there should be .025" to .040" clearance between the high part of the main shaft clutch driven member and the throw-out lever.

To adjust, bend the clutch throw-out lever arm that rides on the clutch throw-out lever cam to meet this requirement.

### Front shaft adjustment (Figure 27)

(a) The gears should line up and there should be some clearance between the lower surface of the front shaft gear and the upper surface of the main shaft driving gear.

(b) The cam sleeve on the front shaft should have some end play, not more than .006".

The first requirement may be met by adding or removing shims between the front shaft lower bearing and its bracket. The bearing bushing in the upper end of the bracket may be adjusted to regulate the end play.

### Transfer Bail Cam Follower Arm Adjustment (Figure 28-A)

**NOTE:** In order to check this adjustment, it will be necessary to remake it.

Loosen the transfer bail cam follower arm clamping screw and back off the cam follower arm adjusting screw three or four turns. Set up the "blank" combination on the swords and rotate the front shaft until the transfer bail cam roller is on the high part of its cam. Move the forward ends of the transfer levers to the right. Turn in the cam follower arm adjusting screw until all five transfer levers snap over to their extreme left. Back off the adjusting screw one-quarter turn; tighten the lock nut and clamping screw.

### Transfer Bail Backstop Screw Adjustment (Figure 28-B)

Hold the selector armature operated and rotate the motor until the cam sleeves on the front and main shafts are in their stop positions.

There should then be some clearance, not more than .010", between the transfer bail backstop screw and the transfer bail.

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**NOTE:** After making a single adjustment, check related adjustments.

To adjust, loosen the transfer bail backstop screw lock nut and position the backstop screw; then tighten the lock nut.

#### Transfer Levers Lock Arm Adjustment (Figure 29)

With the main shaft cam sleeve in its stop position, set up the letter "K" combination on the transfer levers. The transfer levers lock arm should over travel the sides of the transfer levers by .030" to .045" and the clearance between the transfer levers and the lock arm should be approximately equal, when the transfer levers are in either their marking or spacing positions.

To adjust, loosen the transfer levers lock arm mounting screws and position the arm; then tighten the mounting screws.

#### Transfer Bail String Tension (Figure 29)

With the main shaft cam sleeve in its stop position, hook a 32 oz. scale over the right end of the lock arm and pull toward the front of the printer. It should require 13 to 16 ozs. to start the bail moving.

#### Front shaft Clutch Throw-Out Lever bracket Adjustment (Figure 27)

The front shaft clutch throw-out lever arm should ride fully on the clutch throw-out lever cam on the selector cam sleeve, and there should be some clearance, not less than .005" between the throw-out lever arm and the lower edge of the projection on the transfer bail, when the bail is manually operated.

Position the throw-out lever bracket on the front shaft bracket to meet the foregoing requirements.

#### Front Shaft Clutch Throw-Out Lever Stud Adjustment (Figure 27-A)

(a) With the front shaft clutch throw-out lever arm on the high point of the throw-out lever cam, the end of the throw-out lever stud should clear the outer surface of the clutch driven member by .010" to .050".

**NOTE:** Paragraph (b) applies only to printers equipped with old style transfer cam No. 92620. See Note (C)

(b) With the throw-out lever stud riding in the channel of the clutch driven member and the clutch teeth fully engaged, there should be .005" to .010" clearance between the stud and the lower side of the horizontal portion of the channel.

The spacing washers used in mounting the stud may be applied to either side of the lever to meet the first requirement. To meet the latter requirement, set the height of the stud in its slotted mounting hole.

\* \* \*

(C) The new style transfer cam (99196), may be distinguished from the old style transfer cam (92620) in that it rises faster at the peak just preceding the stop position, and has a sharper decline beyond this point. The new cams were installed in the factory on machines with a serial number of 2534 or higher. As a further means of identification, these new cams are now being stamped with a letter "X".

**NOTE:** After making a single adjustment, check related adjustments.

### Front Shaft Clutch Adjustment

**NOTE:** This adjustment applies only to printers equipped with new style transfer cam No. 99196. See Note (C)

(a) The front shaft clutch teeth should be separated by .010" to .020" when the clutch is disengaged by motor power.

This requirement may be met by adjusting the height of the stud in the slotted mounting hole in the front shaft clutch throw-out lever. See figure 27-B.

(b) With the motor power disconnected, the following conditions should be met:

1. With the clutch fully engaged, there should be some clearance between the clutch throw-out lever stud and the upper and lower side walls of its channel in the driven clutch member, when the play of the lever is taken up in a direction to make these clearances a minimum.
2. The clutch teeth should be separated by at least .006" when the front shaft is in the stop position, and when the transfer cam is manually rotated in a direction the reverse of the normal, until the cam follower just rests against the incline on the cam.

### Front Shaft Clutch Throw-Out Lever Spring Tension (Figure 27-B)

Hook an 8 oz. scale over the end of the clutch throw-out lever just below the stud and pull at right angles to the lever. With the clutch teeth engaged, it should require 1 to 3 ozs. to start the lever moving.

### Type Wheel Lifting Bail Cam Follower Arms Adjustment (Figures 14 & 27-B)

Remove the front shaft gear guard. Hold the selector armature operated and rotate the motor flywheel until the cam sleeves on the front and main shafts are in their stop positions. Disengage the clutch on the front shaft and rotate the motor flywheel until the type wheel lifting bail upper arm cam roller is very near the end of the high part of the lifting bail cam on the front shaft cam sleeve. Under the foregoing condition, the following requirements should be met:

(a) The upper cam roller should ride fully on its cam and the lower cam roller should clear the horizontal surface of its cam by not less than .005" as shown on Figure 14-C.

(b) The cam roller on the lower arm should clear the type wheel lifting bail auxiliary cam on the main shaft cam sleeve by .005" to .010" as shown on Figure 14-A.

\* \* \*

(C) The new style transfer cam (99196), may be distinguished from the old style transfer cam (98196), in that it rises further at the peak just preceding the stop position, and has a steeper decline beyond this point. The new cams were installed in the factory on machines with a serial number of 2564 or higher. As a further means of identification, these new cams are now being stamped with a letter "X".

**NOTE:** After making a single adjustment, check related adjustments.

To meet the first requirement, loosen the cam follower arm bracket clamping screws and position the bracket; then tighten the clamping screws.

To meet the second requirement, loosen the lower cam follower arm clamping screws and position the arm by means of the eccentric; then tighten the clamping screws.

#### Type Wheel Adjustment

Select the "L" combination and rotate the type wheel shaft until the stop arm is latched on the "L" stop pin. Raise the type wheel assembly to the letters position and operate the printing hammer until the 'L' pallet touches the platen lightly. Both legs of the "Y" should touch the platen at the same time.

To adjust, loosen the clamping screw on the type wheel drive arm and position the drive arm. See Figure 30 for location of parts.

NOTE: When the clamping screw is tightened, the drive arm should rest on the shoulder on the shaft.

#### Shift Stop Arm Adjustment

Move the shift plate to the letters position (to the rear). Select the "M" combination and rotate the type wheel shaft until the type wheel stop arm is latched on the "L" stop pin. Raise the type wheel assembly to the letters position and operate the printing hammer until the 'L' type pallet touches the platen lightly. The curvature of the type pallet should then conform to the curvature of the platen. Make a similar check with the shift plate in the figures position and a figures character selected.

To adjust, position the shift stop arm on the type wheel guide frame by means of its elongated mounting holes. See Figure 31 for location of parts.

#### Type Wheel Lifting Bail Stud Adjustment (Figure 31)

With the shift plate in the "figures" position, rotate the motor flywheel until the type wheel lifting bail auxiliary cam roller is on the high part of its cam. Under this condition there should be .005" to .02" clearance between the lifting bail and the stud.

To adjust, position the stud in its elongated mounting hole.

#### Type Wheel Lifting Bail Yield Spring Tension (Figure 31)

Hold the selector armature operated and rotate the motor flywheel until the cam sleeves on the front and main shafts are in their stopped positions. Unhook the lifting bail yield spring at its upper end and hook a 32 oz. scale in the spring eye. With the type wheel assembly held downward against its stops, it should require 17 to 21 ozs. to pull the spring to its position length.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

#### Type Wheel Lifting Bail Return Spring Tension (Figure 31)

Hold the selector armature operated and rotate the motor flywheel until the cam sleeves on the front and main shafts are in their stopped positions. Unhook the lifting bail yield spring. Hook an 8 oz. scale under the lifting bail at its rear end and pull vertically upward. It should require 2 to 5 ozs. to start the bail moving. Rehook the yield spring.

#### Carriage Adjustment (Figure 32) - See Note (b)

(a) All lower case character type pallets should clear the platen roll by .055" to .065", when the typewheel has been raised to the "letters" position.

This requirement may be met by the use of shims between the rear carriage bearing rail and the supporting casting.

NOTE: The same number of shims should be used at both ends of the carriage rear bearing rail.

(b) The carriage should be free to move on its ball bearings, with some play, not more than .005".

To obtain this requirement, unhook the carriage return draw strap, loosen the carriage rear bearing rail mounting screws, and adjust the up and down position of the carriage rear bearing rail; then tighten the mounting screws and rehook the draw strap.

NOTE: While making this adjustment, be sure that the spacing rack is not binding on its gear.

#### Function Arm Assembly Adjustment

The function arms should line up horizontally with their associated function levers.

To adjust, add or remove shims between the lower typewheel shaft bearing and the function arm assembly.

#### Type Wheel Shaft End Play Adjustment

The type wheel shaft should have some end play, not more than .010". When checking this end play, make certain that there is some clearance between the type wheel shaft stop arm and the upper bearing of the shaft.

To adjust, loosen the function arm assembly clamping screw (located at the lower end of the type wheel shaft), and position the assembly on the shaft; then tighten the clamping screw.

#### Motor Position Adjustment (Figure 33)

The motor should be positioned up or down to obtain the most favorable alignment between the motor pinion and the gears on the main shaft and type wheel shaft. It should also be positioned forward or backward for equal backlash between the pinion and the two gears.

\* \* \*

(D) This requirement should be checked with the platen crank shaft removed.  
NOTE: After making a single adjustment, check related adjustments.

To adjust, loosen the motor mounting screws and position the motor; then tighten the motor mounting screws.

#### Type Wheel Shaft Stop Arm Adjustment (Figure 34)

(a) Set up the line feed combination on the code discs and rotate the motor flywheel until the type wheel shaft stop arm is latched on the line feed stop pin. Under this condition the projection on the line feed function lever (third from the bottom, should line up with its function arm.

(b), With any stop pin selected and the main shaft rotated until the leading edge of the stop arm has just overlapped the selected stop pin, there should be at least .005" clearance between the top of the selected stop pin and the under surface of the leading edge of the stop arm latch. When checking this clearance, the end play of the type wheel shaft should be taken up in a downward direction.

NOTE: Make certain that the stop arm latch bites fully on the selected stop pin, and that, with the end play of the type wheel shaft taken up in a downward direction there should be some clearance between the type wheel shaft stop arm and the upper bearing.

To adjust, loosen the stop arm clamping screw and rotate the type wheel shaft for requirement (a). Set the up and down position of the stop arm for requirement (b). Tighten the clamping screw.

#### Unshift Lever Stud Adjustment (Figure 31)

Select the "unshift" (Letters) combination and rotate the type wheel shaft until the type wheel stop arm is latched on the unshift stop pin. Release the main shaft clutch and rotate the shaft until the function bail cam roller is on the high part of its cam. Under this condition there should be .005" to .015" clearance between the projection on the unshift pawl and the unshift lever when all the play of the unshift lever is taken up so as to make this clearance a maximum.

To adjust, position the unshift lever stud by means of its elongated mounting hole.

#### Shift Lever Stud Adjustment

Select the "shift" (Figures) combination and rotate the type wheel shaft until the type wheel stop arm is latched on the "shift" stop pin. Release the main shaft clutch and rotate the shaft until the function bail cam roller is on the high part of its cam. Under this condition there should be .005" to .015" clearance between the projection on the shift pawl and the shift lever when all the play of the shift lever is taken up so as to make this clearance a maximum. (See Figure 31 for location of parts.)

To adjust, position the shift lever stud in its elongated mounting hole. (Similar to "Unshift Lever Stud Adjustment.")

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

#### Shift Plate Detent Spring Tension (Figure 31)

Unhook the front end of the shift plate detent spring and hook a 32 oz. scale in the spring eye. It should require 18 to 24 ozs. to pull the spring to its position length. Rehook the spring.

#### Printing Hammer Guide Adjustment (Figure 35-A)

With the type wheel stop arm latched on any stop pin, raise the type wheel assembly and move the printing hammer toward platen. The end of the printing hammer should then be centrally located (as gauged by eye) between the type pallets on either side of the selected type pallet.

To adjust, position the printing hammer guide by means of its elongated mounting holes.

#### Printing Hammer Stop Plate Adjustment

Select the "line feed" combination and rotate the type wheel shaft until the stop arm is latched on the line feed stop pin. Raise the type wheel assembly and fully operate the printing hammer manually. There should then be some clearance, not more than ".010", between the end of the printing hammer and the type wheel casting.

Adjust the stop plate by means of its elongated mounting holes to obtain this clearance. (See Figure 35-3 for location of parts.)

#### Printing Bail Adjusting Screw Adjustment (Figure 35-B)

With the printing arm cam roller resting on the low part of the printing cam, there should be some clearance, not more than ".010", between the end of the printing hammer and any type pallet.

Adjust by means of the printing bail adjusting screw.

#### Printing Bail Yield Spring Tension (Figure 35-B)

Rotate the motor flywheel until the printing arm cam roller is on the high portion of its cam. Apply the rush end of an 8 oz. scale to the end of the printing hammer and push toward the rear of the printer. It should require 1-1/2 to 3 ozs. to start the hammer moving.

#### Printing Arm Spring Position

The printing arm spring is normally hooked in the second hole from the rear of the spring arm. As this spring governs the printing blow, i.e., the force with which the type pallets strike the platen, the printing blow can be increased to give heavier printing by hooking the spring in a hole nearer to the front of the arm. To lessen the blow for lighter printing, hook the spring in a hole nearer to the rear of the arm. With the spring hooked in the second hole from the rear of the spring arm and the front and main shafts in their stopped positions, unhook the spring from its spring post and hook a 4 lb. scale in the spring eye.

\* \* \*

"NOTE: After making a single adjustment, check related adjustments.

It should require 22 to 35 ozs. to pull the spring to position length. See Figure 35-B for location of parts.

#### Platen Pressure Roller Compression Spring Tension

With the springs removed and with a 1x 1o. scale applied to a small disc placed on top of the spring, it should require 1-1/2 to 2-1/4 lbs. to compress each spring to a length of 1/4".

#### Platen Pressure Rollers Release Arm Adjustment (Figure 35)

When the platen pressure roller release lever is in its latched position, there should be .045" to .055" clearance between the lower edge of the bracket, (fastened to the pressure roller mounting plate) and the upper edge of the front carriage bearing rail.

To adjust, loosen the paper roller release arm set screw and position the release arm; then tighten the set screw.

NOTE: The pressure roller release shaft should have some end play, not more than .005".

#### Line Feed Pawl Backstop Eccentric Adjustment (Figure 37)

With the single-double line feed lever in the single line feed position, move the line feed pawl to the rear until the platen has been advanced one line space. With the line feed pawl held in contact with the radial face of a ratchet tooth and the line feed detent roller resting in a notch between two ratchet teeth, there should be some clearance, not more than .008", between the line feed pawl and its eccentric backstop.

To adjust, loosen the line feed eccentric backstop mounting screw and rotate the eccentric to obtain the clearance; then tighten the mounting screw.

NOTE: The high part of the eccentric should be used in the upper position.

#### Single-Double Line Feed Lever Adjustment (Figure 38)

With the single-double line feed lever in the single line feed position (front end up) and the detent roller in a notch between two ratchet teeth, operate the line feed bail manually and observe the engagement of the line feed pawl with the ratchet teeth. As the line feed pawl slides off the single-double line feed lever, it should just fail to engage a tooth on the line feed ratchet, but should fully engage the next tooth toward the rear.

To adjust, loosen the single-double line feed lever mounting screw and position the lever by means of its elongated mounting hole; then tighten the mounting screw.

#### Line Feed Bail Pivot Screws Adjustment (Figure 39)

(a) The hole in the lower extension of the line feed bail should line up

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

with the stud on the line feed bail operating lever, as gauged by eye when the bail is held against the right pivot screw.

To adjust, loosen both right and left pivot screw lock nuts if necessary and position the bail by means of the pivot screws; then tighten the right lock nut.

(b) The line feed bail should have some end play, not more than .010".

To adjust, position the left pivot screw; then tighten the lock nut.

#### Line Feed Bail Adjustment (Figure 40)

Move the single-double line feed lever to the single line feed position and release the carriage so that it returns to its right position. Set up the line feed combination on the code discs, latch the type wheel shaft stop arm on the line feed stop pin, and rotate the main shaft until the function bail roller is on the high part of its cam. The line feed pawl should rotate the platen one line space, the detent roller should rest in a notch between two ratchet teeth, and there should be some clearance, not more than .008", between the driving surface of the line feed pawl and a tooth on the line feed ratchet, when the play in the line feed mechanism is taken up by pressing forward lightly on the line feed pawl to make the clearance the maximum.

To adjust, loosen the line feed bail adjusting screw lock nut and position the screw; then tighten the lock nut.

#### Line Feed Bail Pivot Screw Mounting Plate Adjustment (Figures 39 and 40)

When the carriage is in its left position and with conditions as outlined in the "Line Feed Bail Adjustment," there should be some clearance, not more than .008", between the driving surface of the line feed pawl and a tooth on the line feed ratchet, when the play in the line feed mechanism is taken up by pressing forward lightly on the line feed pawl to make the clearance the maximum.

To adjust, position the left mounting plate by means of the enlarged mounting hole. Recheck the "Line Feed Bail Pivot Screw Adjustment."

#### Line Feed Detent Lever Spring Tension (Figure 41)

With the main shaft cam sleeve in its stop position, hook a 32 oz. scale over the lower end of the line feed detent lever at the spring hole and pull horizontally toward the front of the typing unit. It should require 20 to 28 ozs. to start the lever moving.

#### Line Feed Pawl Spring Tension (Figure 41)

Hold the line feed bail so that the feed pawl is in a notch between two ratchet teeth and away from the eccentric stop. Hook an 8 oz. scale over the line feed pawl spring post and pull vertically upward. It should require 4 to 6 ozs. to start the pawl moving.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

### Platen End Play Adjustment (Figure 42)

The platen should have some end play, not more than .006".

To adjust, loosen the platen clamp screw and position the platen on its bearing tube; then tighten the clamp screw.

### Paper Finger Tension Adjustment

The paper fingers should press against the platen with a minimum of 1-1/2 ozs. and a maximum of 2 ozs. when the platen pressure roller release handle is in its unlatched position. Measure this tension by engaging an 8 oz. scale over the edge of the paper finger and pull horizontally.

To adjust, bend the vertical portion of the paper finger at the point where it joins the horizontal portion.

### Paper Fingers Adjustment

The outer edges of the paper fingers (left and right) should be 5/32" to 1/4" from the ends of the platen. When five inch paper (centrally located) is used, the paper fingers should be fully on the edges of the paper.

To adjust, position the paper fingers by slicing them on their mounting strip.

### Carriage Return Stop Screw Adjustment (Figure 22)

With the carriage in its returned position, hold the dashpot lever so that the plunger washer stops against the dashpot plunger guide. There should be some clearance, not more than .005", between the carriage stop plate and the upper end of the dashpot lever.

To adjust, loosen the carriage return stop screw lock nut and position the screw; then tighten the lock nut.

### Carriage Stop Plate Adjustment (Figure 22)

When eight and one-half inch paper is used, and the carriage is in its extreme right position, the center of the first character printed should be approximately .4" to 1-1/16" from the left end of the platen hub. When five inch (centrally located) paper is used, the center of the first character printed should be approximately 4-1/2" to 4-9/16" from the left end of the platen hub.

To adjust, remove the lever crank shaft bracket, loosen the carriage stop plate mounting screws and position the stop plate; tighten the mounting screws.

\* \* \*

"NOTE: After making a single adjustment, check related adjustments.

#### Spacing Ratchet Position Adjustment (Figure 43)

With the main shaft cam sleeve in its stop position, operate the carriage return lever, without latching it, so that the carriage returns to the right side. Then move the carriage slightly to the left until the space retaining pawl engages a tooth on the spacing ratchet. There should be some clearance, not more than .005", between the carriage stop plate and the carriage return stop screw.

To adjust, loosen the spacing ratchet clamping screws, and position the ratchet; then tighten the clamping screws. (See Figure 45.)

#### Right Margin Adjusting Screw Adjustment (Figure 43)

Space the carriage 71 spaces from its extreme right position. (The carriage will then be in position to print the 72nd character.) Take certain that there is some clearance between the line feed detent lever stud and the ribbon guide. If there is no clearance, recheck the Carriage Return Stop Screw Adjustment and the Spacing Ratchet Position Adjustment."

NOTE: When five inch (centrally located) paper is used, space the carriage 36 spaces.

There should be .010" to .020" clearance between the carriage stop plate and the right margin adjusting screw.

To adjust, loosen the right margin adjusting screw lock nut, and position the screw; then tighten the lock nut.

REPLACE THE PLATEN CRANK SHAFT BRACKET AND THE PLATEN CRANK SHAFT.

#### Platen Crank Shaft Bracket Adjustment

The platen crank shaft should not interfere with the free movement of the carriage at any point of its travel.

To adjust, loosen the platen crank shaft bracket mounting screws and position the bracket; then tighten the mounting screws. If necessary, add or remove shims between the bracket and casting to aid in meeting the requirement.

#### Carriage Return Release Lever Adjustment (Figure 45)

With the main shaft cam sleeve in its stop position and the carriage returned, unlatch the carriage return lever and advance the carriage one space, making sure that a tooth on the spacing ratchet is resting against the space retaining pawl. Then release the main shaft cam sleeve and rotate the main shaft until the operating cam roller is on the high part of its cam. The carriage return release lever should clear the carriage return release lever link by .005" to .015" when the play in the carriage return release lever link is taken up to make this clearance a minimum.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

To adjust, loosen the screw which mounts the eccentric on the dashpot lever and position the eccentric; then tighten the screw. When adjusted, the center of the eccentric should be above the center of the eccentric mounting screw head.

#### Dashpot Lever Return Spring Tension

Move the carriage to the left out of engagement with the dashpot lever. Unhook the upper end of the dashpot lever spring and hook a 64 oz. scale in the spring eye. It should require 28 to 36 ozs. to pull the spring to position length.

#### Signal Bell Adjustment

With the main shaft cam sleeve in its stop position, there should be .020" to .040" clearance between the signal bell and its hammer.

To adjust, loosen the signal bell mounting screw and position the signal bell by means of its elongated mounting hole; then tighten the screw.

#### Signal Bell Hammer Spring Tension

Unhook the spring from its spring post. With a 64 oz. scale hooked in the spring eye, it should require 24 to 36 ozs. to extend the spring to its unoperated position length.

#### Margin Bell Hammer Eccentric Adjustment (Figure 46-A)

There should be .030" to .050" clearance between the margin bell and its hammer.

To adjust, position the margin bell hammer eccentric by means of its mounting screw.

NOTE: After making this adjustment, there should be at least  $1/32"$  clearance between the screws on the margin bell adjusting bracket and the margin bell hammer pawl. If necessary, reposition the margin bell on its mounting screw to obtain this clearance and reset the eccentric.

#### Margin Bell Adjusting Bracket Adjustment (Figure 46-A)

The margin bell should ring when the carriage has been advanced to the 66th space.

To adjust, loosen the margin bell adjusting bracket mounting screws and position the bracket; then tighten the mounting screws.

#### Margin Bell Hammer Spring Tension (Figure 46-B)

Hook a 64 oz. scale over the upper end of the margin bell hammer pawl and pull horizontally to the left. It should require 28 to 40 ozs. to start the bell hammer moving.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

Carriage Return Spring Tension Adjustment (Figure 42)

With the carriage in its extreme right position, latch the carriage return lever and hook a 32 oz. scale on the left end of the carriage and pull toward the left; at the same time hold the dashpot lever so that it cannot follow the carriage. It should require 29 to 31 ozs. to start the carriage moving.

Adjust as follows: To increase the tension, turn the carriage return spring drum hexagonal nut clockwise. To decrease the tension, operate the escapement lever.

Dashpot Vent Screw Adjustment

The carriage should return from its extreme left position with minimum shock without bouncing, when the carriage return lever is held in its latched position.

To adjust, reposition the dashpot vent screw. If proper operation of the carriage cannot be obtained by adjusting the screw, replace the dashpot leather washer.

Ribbon Reverse Lever Detent Pressure Adjustment (Figure 47) - See Note (D)

Apply the push end of an 8 oz. scale to the end of the straight portion of the flat spring at the "V." It should require 2 to 3 ozs. to push the detent away from the detenting projection of the ribbon reverse lever when the lever is in either of the two detenting positions.

The detent point of the ribbon reverse lever should travel equally on each side of its detent.

To adjust, loosen the detent mounting screws and position the detent; then tighten the mounting screws.

Ribbon Reverse Lever Adjustment (Figure 48) - See Note (D)

The ribbon reverse lever should overlap the reversing projections on the ribbon feed pawl equally when the ribbon feed pawl is in either its right or left-hand position.

To adjust, bend at the thin portion of the dovetail end of the ribbon reverse lever.

Ribbon Feed Ratchet Friction Drag Adjustment (Figure 47)

- (a) The ribbon feed ratchet should be positioned on the ribbon spool shaft so that the shaft will have some end play, not more than .010".

\* \* \*

(L) These requirements should be checked with the ribbon feed assembly removed.

NOTES: After making a single adjustment, check related adjustments.

To adjust, position the ribbon feed ratchet by means of its set screw.

- (b) With the ribbon feed pawl and the ribbon check pawl away from the ratchet, apply an 8 oz. scale to the pin on the ribbon spool shaft and pull at a tangent. It should require 3 to 6 ozs. to start the ratchet moving. Check both ratchets.

To adjust, bend the drag spring slightly, when necessary, to provide the proper friction drag.

#### Ribbon Feed Operating Lever Link Adjustment (Figure 50)

With the function bail roller on the high part of its cam, there should be some clearance, not more than .025", between the ribbon reverse lever and the reversing projections on the ribbon feed pawl. Check both positions of the ribbon reverse lever.

NOTE: When checking this clearance, the ribbon feed pawl should be between two teeth on the feed ratchet.

To adjust, loosen the ribbon feed operating link mounting screw and position the link; then tighten the mounting screw.

#### Ribbon Feed Pawl Spring Tension (Figure 51)

With the ribbon feed lever in its unoperated position, unhook the ribbon feed pawl spring, at its forward end, and hook a 32 oz. scale in the spring eye. It should require 8 to 10 ozs. to pull the spring to its operating position length.

#### Ribbon Guide Adjustment

With the letter "M" combination selected and the main shaft rotated until the letter "L" is in a position to print, there should be a clearance of .015" to .020" between the closest portion of the ribbon guide and the type wheel type pallets which are normally in the second slot to the right and to the left of the letter "K". When checking this clearance, the play in the type wheel shaft and ribbon guide should be taken up in a direction to make the clearance a minimum.

To adjust, loosen the ribbon guide mounting screws and position the guide; then tighten the mounting screws.

#### Ribbon Feed Check Pawl Spring Tension (Figure 49)

Unhook the ribbon feed check pawl spring from its spring post and hook an 8 oz. scale in the spring eye. It should require 4 to 7 ozs. to pull the spring to its operating position length.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

"Make-Break" (Motor Stop) Contacts Adjustment (Figure 52)

- (a) With the shift plate in the shift position (forward), set up the motor stop combination on the code discs and rotate the type wheel shaft until the stop arm is latched on the selected stop pin. With the function bail roller on the high part of its cam, there should be .010" to .020" clearance between the inside contact spring and the upper end of the spring stiffener. (See Figure 52-A).

To adjust, bend the stiffener.

- (b) This requirement should be checked with the contact bracket removed from the typing unit. Hook an " oz. scale to the inside contact spring, just above the stiffener. It should require 3 to 5 ozs. to start the contact spring moving away from the stiffener.

To adjust, bend the inner contact spring. Recheck (a). Replace the bracket.

- (c) With the main shaft cam sleeve in its stop position, there should be .015" to .025" clearance between the inside and center contact points when the center spring touches the outer spring. (See Figure 52-B).

To adjust, bend the outer contact spring.

- (d) With the main shaft cam sleeve in its stop position, apply the push end of an 8 oz. scale to the insulator on the center contact spring. It should require 3 to 5 ozs. to start the center contact spring moving away from the outside contact spring. (See Figure 52-B).

To adjust, bend the center contact spring. Recheck (c).

"Make" and "Break" (Break Lock) Contacts Adjustments (Figure 53)

- (a) Operate the break lock lever manually until it is latched. The "break" contact points should be separated by .010" to .020". At the same time there should be .010" to .020" clearance between the inside "make" contact spring and its stiffener. (See Figure 53-A).

To adjust, bend the front "break" contact spring to meet the first requirement. Bend the rear stiffener of the "make" contacts to obtain the second requirement.

- (b) With the break lock lever unlatched, there should be .015" to .025" clearance between the "make" contact points. (See Figure 53-B).

To adjust, bend the front stiffener of the "make" contacts.

- (c) Apply the push end of an 8 oz. scale to the outside "make" contact spring, just above the stiffener. It should require 1 to 3 ozs. to start the outside "make" contact spring moving away from its stiffener. (See Figure 53-B).

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

To adjust, bend the outside "make" contact spring.

- (d) Remove the contact bracket from the typing unit. Hook an 8 oz. scale over the inside "make" contact spring just above the contact point. It should require 3 to 5 ozs. to start the contact spring moving away from its stiffener. (See Figure 53-B).

To adjust, bend the inside "make" contact spring. Recheck (b). Replace the contact bracket.

- (e) Apply the push end of an 8 oz. scale to the inside "break" contact spring, just below the insulator. It should require 3 to 5 ozs. to start the inside "break" contact spring moving away from the outside "break" contact spring. (See Figure 53-B).

To adjust, bend the inside "break" contact spring. Recheck the first requirement of (a).

#### Break-Lock Lever Latch Bracket Adjustment (Figure 54)

Set up the "blank" combination on the core discs and rotate the type wheel shaft until the stop arm is latched on the blank stop pin. With the function bail cam roller on the high part of its cam, the break-lock lever should overtravel the shoulder on the latch by .010" to .020".

To adjust, loosen the break-lock lever latch bracket mounting screws and position the bracket; then tighten the mounting screws.

#### Break-Lock Lever Latch Spring Tension (Figure 54)

If the break-lock lever overtravels the latch, as described in the Break-Lock Lever Latch Bracket Adjustment, hook an 8 oz. scale under the forward end of the latch and pull upward. It should require 1/2 to 1-1/2 ozs. to start the latch moving.

#### Function locking plate adjustment (Figure 55)

- (a) The following requirement applies only to printers equipped with both signal bell and motor stop mechanism.

With the shift plate in the letters position, the blocking plate should be so set as to block the action of the two lower function pawls when the "signal bell" and "motor stop" functions are alternately selected.

To adjust, position the function blocking plate so that the arm having the greater blocking surface is toward the rear of the printer (Figure 55-A). Then set the height of the blocking plate by means of its elongated mounting holes.

- (b) The following adjustment applies to printers equipped with signal bell or motor stop mechanism, with or without the break lock mechanism.

\* \* \*

N.F.L.: After making a single adjustment, check related adjustments.

With the shift plate in the letters position, the blocking plate should be so set as to block the action of the fourth (from the top) function pawl only and should project approximately  $1/32"$  below the lower edge of this function pawl.

To adjust, position the function blocking plate so that the arm having the least blocking surface is toward the rear of the printer (Figure 55-1). Then set the height of the blocking plate by means of its elongated mounting holes.

#### Type Wheel Shaft Friction Clutch Adjustment

Run the motor for at least ten minutes. Hook a 32 oz. scale, held in a horizontal position, to the stop arm, close to the selected stop pin and at the same time hold the stop pin out of engagement with the stop arm. It should require 15 to 20 ozs. to hold the stop arm against the friction drag.

To adjust, loosen the capstan nut lock nut on the bottom of the type wheel shaft and position the capstan nut to regulate the clutch tension; then tighten the lock nut. When loosening or tightening the capstan nut lock nut hold the capstan nut with the capstan wrench so as to impart no strain on the stop arm.

#### Selector Clutch Spring Tension

With the motor running at least 10 minutes, hook a 32 oz. scale on the vertical portion of the selector cam sleeve stop arm and pull at right angles to the arm. It should require 14 to 18 ozs. to hold the sleeve stationary.

#### Typing Unit Slip Connection Adjustment

With the rear casting of the typing unit resting on a plane surface, and the front end supported  $1-1/4"$  above the plane surface by the 93E47 printer supporting post, the ends of the slip connection springs should be  $7/8$  to  $15/16$  of an inch away from the plane surface.

Adjust by bending the springs.

#### Synchronous Motor Requirements

NOTE: These requirements should not be checked unless the motor has been taken down or there is reason to believe that the starting switch is out of adjustment.

If the motor is mounted on the typing unit, it should be removed by removing the three motor mounting screws.

To adjust the starting switch, proceed as follows:

1. Remove the motor fan and pinion.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

2. Remove the switch end shield by removing the two end shield mounting screws. Then remove the two screws that mount the split ring to the end shield.
3. Pull the rotor out of the frame so that the switch is readily accessible.
4. The brush arms should be free, without binding.
5. To check the brush arm spring tension requirement proceed as follows: Hold the rotor so that one of the brush arm springs is in a horizontal position. Hook an 8 oz. scale over the brush arm, at the spring hole, and pull in line with the spring. It should require 5 to 8 ozs. to just pull the brush arm against its stop. Check each spring for this requirement.
6. There should be at least 1/32" clearance between the split rings, and this clearance should be free from foreign matter which might short the two segments of the ring.
7. Remount the split ring to the switch end shield, tightening each screw alternately, a little at a time until both screws are tight.
8. Remount the end shields using the same precaution in tightening the screws as in the foregoing.
9. Replace the motor fan and pinion.

#### Armature End Play Spring Tension

NOTE: This requirement applies to both AC, synchronous and DC motors equipped with floating bearings.

Apply the push end of a 12 pound scale to the switch end of the rotor and push in line with the shaft. It should require at least 4 pounds to start the shaft moving.

Remount the motor on the typing unit and check the "Motor Position Adjustment."

#### KEYDOWN AND BASE UNIT ADJUSTMENT

#### Lock Loop Spring Tension (Figure 55)

With the lock loop roller resting on the low part of its cam, hook an 8 oz. scale in the lock loop spring hole and pull in line with the spring. It should require 4 to 5 ozs. to start the lock loop moving.

#### Locking Lever Bracket Adjustment (Figure 56)

- (a) With all the contact levers on the high part of their cams, there should be some clearance, not more than .010", between the contact levers and the locking levers, when the locking levers are pressed down by hand to make this clearance a minimum.

\* \* \*

NOTE: After making a single adjustment, check related adjustments,

- (b) The locking levers should travel equally on either side of the locking loop blade, when the "letters" and "blank" key levers are alternately depressed.

NOTE: If no blank key lever is provided on the keyboard, use the key levers "R" and "Y" instead of "letters" and "blank."

To adjust, add or remove shims between the locking lever bracket and the keyboard casting to meet the first requirement and before tightening the bracket mounting screws, position the bracket laterally to meet the second requirement.

#### Lock Loop Roller Adjustment

NOTE: This adjustment applies only to those keyboards equipped with lock loops having elongated holes for the roller pivot screws.

Rotate the keyboard shaft until the clutch teeth are disengaged. Press the lock loop roller against its cam to fully disengage the teeth. Position the locking levers directly below the lock loop blade to make the clearance a minimum. Under these conditions there should be .008" to .015" clearance between the lock loop blade and the locking lever having the least clearance.

To adjust, position the roller pivot screw in the elongated hole in the lock loop.

#### Transmitting Contacts Gap Adjustment (Figure 56)

With each contact lever on the high part of its cam, the contact gap should be .020" to .025".

To adjust, bend the shorter contact spring.

#### Contact Spring Pressure (Figure 57)

With any contact lever on the low part of its cam, apply the push end of an 8 oz. scale to the contact spring, just above the contact point. It should require a pressure of 4-1/2 to 5-1/2 ozs. to open the contacts.

To adjust, bend the longer contact springs. Recheck the contact gap adjustment.

#### Clutch Spring Compression (Figure 58)

With the clutch teeth fully engaged and the clutch throw-out lever held away from the clutch driven member, hook a 32 oz. scale over the shoulder on the clutch driven member and pull toward the front of the keyboard, directly in line with the shaft. It should require 9 to 12 ozs. to separate the clutch teeth.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

### Clutch Adjustment (Figure 59)

There should be a clearance of .005" to .015" between the clutch teeth when the clutch is fully disengaged.

Adjust for this requirement by adding or removing shims between the clutch throw-out lever post and the bracket.

### Selector Bar Bracket Shims Adjustment (Figure 60) - See Note (E)

Depress the "B" key lever. There should be a clearance of .010" to .016" between the inclined surfaces of the front selector bar saw teeth and the lower edges of the undepressed key levers.

Check this clearance on at least two key levers near each side of the keyboard.

To adjust, add or remove shims between the right and left selector bar brackets and the base casting.

NOTE: Normally there should be 1 No. 3458 shim (.015" thick) and 5 No. 93737 shims (.004" thick) between each selector bar bracket and the base casting.

### Universal Bar Bracket Shims Adjustment - See Note (E)

With the keyboard clutch in its disengaged position, depress the "letters," "line feed," and "L" key levers simultaneously (use an 'L' wrench, placed on top of these three key levers). There should be zero to .004" clearance between the trip-off pawl and its stop plate, and there should also be zero to .004" clearance between the universal bar and the depressed key lever having the least clearance. In a similar manner, check the clearances when the "figures," "Z," and "A" key levers are depressed simultaneously by means of the "R" wrench.

To adjust, position the trip-off pawl stop plate. If necessary, add or remove shims between the universal bar brackets and the selector bar brackets so that the trip-off pawl stop plate can be positioned to meet the requirement. This is a preliminary adjustment of the trip-off pawl stop plate and is made in this manner to assure an equal travel of the trip-off pawl when key levers at either end are depressed. (See Figure 60 for location of parts.)

NOTE: Normally there should be 1 No. 3458 shim (.015" thick) and 4 No. 93737 shims (.004" thick) between the selector bar brackets and universal bar brackets.

### Universal Bar Pilot Screws Adjustment (Figure 60) - See Note (E)

The universal bar extension should be approximately in the middle of the space between the ":" and "Carriage Return" key levers, and the universal bar should have some end play, not more than .010". Also, the trip-off pawl should clear the sides of the stop plate mounting screws and the locking lever bracket when the trip-off pawl is operated by depressing a key lever. (See Figure 59 for location of parts.)

\* \* \*

(E) These requirements should be checked with the keyboard base plate removed.

NOTE: After making a single adjustment, check related adjustments.

To adjust, loosen the universal bar pilot screw nuts and position the pilot screws; then tighten the nuts.

#### Intermediate Pawl Eccentric Adjustment (Figure 59)

With the intermediate pawl held against the intermediate pawl eccentric, depress the "letters," "line feed," and "L" key levers simultaneously (use an "R" wrench, laid on top of these three key levers). Under these conditions there should be a clearance of ".015" to ".020" between the engaging surfaces of the trip-off pawl and the intermediate pawl.

To adjust, loosen the trip-off pawl stop plate mounting screws and move the plate to the rear. Loosen the trip-off pawl eccentric lock nut and position the eccentric in the rear half of the adjustment provided by the eccentric and so that the slot in the eccentric lines up with the center of the intermediate lever pivot screw. Tighten the lock nut sufficiently to hold the trip-off pawl eccentric in position. Loosen the intermediate pawl eccentric and, under the conditions specified in the previous paragraph, adjust the eccentric, using only the forward half of the adjustment provided by the eccentric, to meet the foregoing requirements. Tighten the lock nut.

#### Clutch Throw-Out Lever Eccentric Adjustment (Figure 57)

The intermediate pawl should be held firmly between the clutch throw-out lever and the intermediate pawl eccentric when the clutch throw-out lever is resting on the low part of the clutch driven member.

To adjust, loosen the clutch throw-out lever eccentric lock nut and position the eccentric, using an off-set screw driver; then tighten the lock nut.

**NOTE:** The clutch throw-out lever eccentric should be assembled with its head on the left side of the intermediate pawl viewed from the front of the keyboard.

#### Trip-Off Pawl Eccentric Adjustment (Figure 51)

Position the clutch driven member so that the clutch throw-out lever will rest on the high part of the clutch driven member. Hold the clutch throw-out lever eccentric against the clutch throw-out lever. Under these conditions, when a key lever is depressed, the end of the trip-off pawl should clear the end of the intermediate pawl by not more than ".004".

To adjust, loosen the trip-off pawl eccentric lock nut and position the eccentric, using the rear half of the adjustment provided by the eccentric. Tighten the lock nut.

#### Trip-Off Pawl Stop Plate Final Adjustment

With the keyboard clutch in its disengaged position, depress the "letters," "line feed," and "L" key levers simultaneously (use an "R" wrench, laid on top of these three key levers). Under this condition there should be zero to ".004" clearance between the trip-off pawl and the stop plate and at the same time zero to ".004" clearance between the universal bar and the depressed key lever having the least clearance.

\* \* \*

**NOTE:** After making a single adjustment, check related adjustments.

To adjust, loosen the trip-off pawl stop plate mounting screws and position the stop plate. Tighten the screws.

#### Clutch Throw-Out Lever Spring Tension

With the clutch teeth engaged and the clutch throw-out lever resting against the low part of the clutch driven member, hold the intermediate pawl against its eccentric; at the same time hook an 8 oz. scale over the throw-out lever just above the spring hole and pull in line with the spring. It should require 1-1/2 to 2-1/2 ozs. to start the lever moving.

#### Trip-Off Pawl Spring Tension (Figure 62)

Unhook the trip-off pawl spring from the bracket and hook an 8 oz. scale in the spring eye. It should require 2-3/4 to 3-3/4 ozs. to pull the spring to its position length. Rehook the spring.

#### Transmitting Cam Sleeve End Play Adjustment (Figure 63)

The transmitting cam sleeve should have some end play, not more than .002".

To adjust, loosen the rear bearing bracket adjusting nuts and position the bushing; then tighten the nuts.

#### Key Lever Spring Tension Adjustment (Figure 64)

The openings between the ends of all key lever springs, except the spacer key lever spring, should measure 1-3/16". The spacer key lever spring should measure 1-15/16" across the opening, between the ends.

Adjust for these requirements by bending the springs.

#### Repeat Space Rod Adjustment

With the space bar fully depressed, by applying pressure at approximately the center of the bar, there should be .010" to .020" clearance between the clutch throw-out lever and the raised surface of the clutch driven member.

To adjust, loosen the repeat space rod adjusting nuts and position the rod. Tighten the lock nuts, making certain that the bushing between the nuts has barely perceptible end play after the nuts are tightened.

#### Repeat Space Rod Bracket Adjustment (Figure 65)

- (a) When the space bar is fully depressed, there should be some clearance, not more than .008", between the formed end of the repeat space rod and the transmitter rear bracket.
- (b) The front face of the repeat space rod bracket should be parallel to the rear surface of the transmitter rear bracket.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

To adjust for the above requirements, loosen the repeat space rod bracket mounting screw and position the bracket; then tighten the mounting screw.

#### Repeat Space Rod Spring Tension (Figure 65)

Hook an 8 oz. scale over the repeat space rod, just in front of the spring hole, and pull in line with the spring. It should require 1 to 2 ozs. to start the rod moving.

#### Keyboard Idler Gear Adjustment

The keyboard lower idler gear should rotate freely with a minimum amount of backlash.

To adjust, loosen the idler gear stud lock nut and position the gear by means of the stud. Tighten the lock nut.

#### Typing Unit Position Adjustment

The main shaft gear should engage the keyboard upper idler gear with a minimum amount of backlash without binding for one complete revolution of the main shaft gear.

To adjust, loosen the three thumb nuts which hold the typing unit to the base and position the typing unit. Tighten the thumb nuts.

#### Break-Lock Contacts Operating Lever Latch Adjustment (Figure 66)

When the "letters" key lever is depressed and the break-lock operating lever is just opposite the shoulder on its latch, there should be a clearance of .015" to .025" between the lever and the latch.

To adjust, loosen the break-lock release lever mounting screw and position the lever on the "letters" key lever. Tighten the mounting screw.

#### Cover Lid Stop Screws Adjustment

- (a) When ordinary roll paper is used, the cover lid stop screws should be flush with the surface of the cover.
- (b) When super-fold paper is used, the cover lid stop screws should project just enough to permit the paper to feed through the cover properly.

To adjust, loosen the lock nut on each stop screw and position the stop screws; then tighten the lock nuts.

#### Cover Glass Adjustment

The upper edge of the glass should be set back approximately 5/16" from the upper edge of the front cover lid. The glass should be centrally located by the retainers.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

To adjust, loosen the retainer mounting screws and position the glass; then tighten the mounting screws.

#### GOVERNOR ADJUSTMENTS

##### Speed Adjusting Wheel Friction Washer Spring Pressure (Figure 67)

To measure this requirement, remove the governor cover and rotate the speed adjusting wheel to a point where the governor contact pressure is from 13 to 14 ozs., as indicated by hooking a 32 oz. scale over the contact spring next to the contact point and pulling parallel to the speed adjusting spring. Then insert a bank pin (radially) in the leather rim of the speed adjusting wheel, and hook a 32 oz. scale over the pin at the periphery of the adjusting wheel and pull horizontally at right angles to the pin. It should require 16 to 20 ozs. to start the wheel moving. To adjust the friction, remove the friction washer and bend the large projections. Replace the governor cover.

##### Governor Brush Spring Requirement (Figure 68-B)

Remove the governor brush holder from the brush holder bracket. It should require 3 to 4 ozs. pressure, using an 8 oz. scale, to depress a brush spring to its required position, that is, to within .015" to .050" of the brush holder. Remove the governor brushes from the brush holder. The pigtails should be soldered to both the carbon brushes and the brass inserts of the brush screws. Replace the brushes and holder.

##### Motor End Thrust Spring Tension

With a 12 pound scale applied horizontally to the side of the governor fan, it should require a pressure of at least 4 pounds to start the motor shaft moving against the tension of the end thrust spring.

##### Governor Brush Position (Figure 68-A)

The governor brushes should ride in the center of the collector rings and should project .015" to .050" beyond the brush holder.

To adjust, position the brush holder bracket by means of its elongated mounting holes.

##### Speed Setting

The printers are equipped with governed or synchronous motors. A tuning fork is used for the purpose of regulating the motor speed of governed motors. The fork is equipped with shutters attached to the ends of the tines. On the rim of the motor flywheel is attached a speed target of alternate black and white spots.

To check the speed, see that the target is well lighted and tap the fork lightly to start it vibrating. Hold the fork close to the eye and view the moving spots on the target through the fork shutters. If the motor is running at the correct speed, the spots will appear to be stationary. If the motor is running fast, the spots will appear to be moving in the direction in which the motor is

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

rotating; if slow, in the opposite direction. To regulate the motor speed, stop the motor and rotate the outer side of speed adjusting wheel in the direction of the governor rotation to increase the motor speed or opposite to the direction of the governor rotation to decrease the speed.

NOTE: There is a possibility of setting the speed incorrectly, due to getting a speed multiple; i.e., the speed could be half the desired speed, or twice the speed, or some other multiple, but the spots would appear to be stationary through the fork shutters. This should be kept in mind if trouble is experienced in the operation of the printer.

#### Orientation

Mounted above the vertical main shaft of the printer is the range finder assembly used for the purpose of orientating the receiving printer to the incoming signals.

The letters "RY" should be transmitted to the printer (the letters "R" and "Y" sent alternately) continually while the range is being checked.

While "RY" is being received, loosen the thumb screw and shift the index arm of the range finder toward "Zero" until errors begin to appear in the "RY." Then move it back slowly until these errors disappear. This position indicates one limit of the orientation range. Note the position on the scale.

Repeat the same performance toward the opposite end of the scale to find the other limit.

After the two limits (or extreme positions of perfect printing) have been found, the range finder should be set midway between these two points.

#### Line Current

60 milliamperes at 110 volts, direct current, is required for the magnet coils wired in parallel.

#### Magnet Coil Resistance

The magnet coils measure 92 ohms each.

#### Local Power Requirements

The printers can be equipped with motors for 110 volts A.C. or 110 volts D.C. About 100 watts is generally required for the operation of a single set. For synchronous motors, the 110 volts A.C. must be of controlled frequency.

#### Paper Chute Adjustment

The lower end of the paper chute should clear the cover by approximately 1/4".

To adjust, bend the mounting ears of the paper chute.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

Small Paper Roll Holder Adjustment

NOTE: If the printer is equipped with a small paper roll holder, the following requirement should be met.

The small paper roll holder should be centrally located between the carriage return spring drum stud and the cover.

To adjust, bend the mounting ears of the paper roll holder.

Control Relay Adjustments

- (A) For "break" operation, the control relay should be adjusted to meet the following requirements: (See Figure 69-A).
  - (a) With the relay plunger held operated, there should be .005" to .010" clearance between the contact surfaces of the outer and middle contact springs.

Adjust by bending the outer contact spring.
  - (b) With the plunger held operated, there should be .025" to .030" clearance between the contact surfaces of the inner and middle contact springs.

Adjust by bending the inner contact spring.
  - (c) When an 8 oz. scale is hooked over the middle contact spring at the side of the contact and pulled at right angles horizontally to the contact spring, it should require 5 to 6 ozs. to cause the middle contact spring to break contact with the inner contact spring.

Adjust by bending the middle contact spring.
  - (d) Recheck (b).
- (B) For "make" operation, the control relay should be adjusted to meet the following requirements: (See Figure 69-B).
  - (a) Hold the relay plunger operated and hook a 32 oz. scale over the end of the outer contact spring and pull horizontally at right angles to the contact spring. It should require 12 to 16 ozs. to cause the outer contact spring to break contact with the middle contact spring.

Adjust by bending the outer contact spring.
  - (b) With the relay plunger held operated, there should be .030" to .040" clearance between the contact surfaces of the inner and middle contact springs.

Adjust by bending the inner contact spring.

\* \* \*

NOTE: After making a single adjustment, check related adjustments.

- (c) Hook an 8 oz. scale over the middle contact spring at the side of the contact and pull horizontally at right angles to the contact spring. It should require 1-1/2 to 2 ozs. to cause the middle contact spring to break contact with the inner contact spring.

Adjust by bending the middle contact spring.

- (d) Recheck (b).

The operating current for the control relay should be between .050 A. and .060 A. when adjusted for either "make" or "break" operation.

#### LUBRICATION SPECIFICATION

The oil and grease specified in the supplement furnished with this bulletin should be used to lubricate the printer.

Unless otherwise specified, one or two drops of oil at each of the places indicated will be sufficient. Use oil for lubrication at all of the places listed below, except where the use of grease is specified.

#### 1. Typing Unit

##### A. Main Shaft Assembly

1. Main shaft bearings - fill 2 oil cups.

NOTE: The main shaft bearing bushings have graphited grooves, therefore a soft rag, wet with a cleaning fluid, such as carbon tetrachloride, should be used when cleaning.

2. Function cam - grease.
3. Operating cam - grease.
4. Operating bail roller - oil and grease.
5. Print cam - grease.
6. Printing bail roller - oil and grease.
7. Type wheel lifting bail cam - grease.
8. Brake rollers - oil.
9. Main clutch - driven - both above and below sliding member.
10. Cam sleeve assembly - between the sliding clutch member and the clutch engaging cam sleeve collar.
11. Clutch throw-out lever - 2 bearings, and extension which engages driven clutch.
12. Selector cam sleeve (Assem.).
  - (a) Shaft bearing - fill oil hole in upper end of shaft.
  - (b) Friction clutch felt washers - saturate (separate discs).
  - (c) Selecting cam surfaces.
  - (d) Armature lever cam - saturate felt washer.

##### B. Selector

NOTE: Be careful not to get oil or grease between the pole faces of the selector magnets and the magnet armature.

1. Selector levers and swords - drop oil between separating plates of swords and levers.

2. Transfer levers - all points of contact.
3. Code disc levers - drop oil between separators and on pivot bearing; grease the connections with the code discs levers and code discs when assembling; oil for subsequent lubrication.
4. Code disc bearing.
5. Stop pins - at guide slots and rollers.
6. Armature lever - 2 pivot screws.
7. Selector arm - 2 pivot screws, 2 sword contact points, locking tip, and detent.
8. Locking lever - separator surface and locking tip.
9. Transfer bail.
  - (a) Transfer bail yield spring - grease points of contact with bail and selector levers.
  - (b) Transfer lever lock arm - grease.
  - (c) Roller - oil and grease.
  - (d) Transfer bail shaft - saturate 2 felt washers.
10. Range finder assembly - trip latch, trip latch plunger, bell crank lever, and stop lever.
11. Selector arm operating screw head - oil sparingly.

C. Front Shaft Assembly

1. Fill hole in shaft with oil.
2. Clutch trip cam - grease.
3. Transfer cam - grease.
4. Type wheel lifting bail cam - grease.
5. Clutch throw-out lever - oil 2 bearings - grease stud which engages driven clutch member.
6. Clutch - driven - both above and below sliding member.
7. Cup at lower end of shaft - several drops.
8. Type wheel lifting bail shaft - saturate 2 felt washers with oil.
9. Type wheel lifting bail cam rollers oil and grease - saturate felt wick.

D. Function mechanism

1. Function bail - saturate felt washer and wick.
2. Function bail roller - oil - grease - oil.
3. Function pawls - oil pivot and blocking points, grease guide slot and latch points.
4. Function pawls at shift and unshift levers - oil.
5. Function pawl latches - oil pivot and guide slot; grease latch tip and point of contact between function pawl latches and stop.
6. Function levers - pivot, guide slot, and point of contact with function arm.
7. Function intermediate levers - pivot, guide slot.
8. Type wheel shift assembly - grease type wheel fork and lifting bail stud; oil and grease entire slide assembly at stud; oil detent lever at bearing and bushing, oil shift plate at guide, saturate felt washers with oil.
9. Shift and unshift levers - oil pivots, grease forks.
10. Shift stop arm - grease.
11. Space cut-out levers - oil pivots.

12. Line feed mechanism.
  - (a) Line feed bail - oil 2 pivots, grease surface on which roller bears.
  - (b) Line feed bail link - grease shoulder screw and points of engagement with bail.
  - (c) Line feed roller - oil and grease.
  - (d) Line feed pawl shaft - 2 bearings.
  - (e) Line feed pawl - pivot, points of contact with ratchet, and eccentric stop.
  - (f) Line feed ratchet - grease all teeth lightly.
  - (g) Line feed detent; oil and grease roller, oil detent arm pivot.
  - (h) Single-double line feed lever; grease points of contact with line feed pawl.
13. Carriage return release lever link - grease guide slot; oil shoulder screw.
14. Break-lock lever latch pivot. Also points of contact with break-lock release lever and break-lock lever.
15. Printing bail bearings - 2 places.
16. Printing hammer - at guide and shoulder screws.
17. Printing arm roller - oil and grease.
18. Operating bail - bearings.
19. Operating bail roller - oil and grease.

E. Type Wheel Shaft Assembly

1. Friction clutch - saturate felt washers (separate washers).
2. Main bearings - oil groove in upper bearing. Care should be taken to see that sufficient oil gets into the interior of the shaft housing to saturate the felt wick wrapped around the shaft.
3. Type wheel drive arm at slot.
4. Type wheel stop arm latch - pivot, guide and latch face.
5. Type pallet lubrication - brush type pallets and guides with very light gamless oil when assembling.
6. Type wheel shaft gear - fill two oil holes or groove in the top surface of the gear, at the edge of the clutch disc.

NOTE: If the gear has oil holes, they are opposite each other and may be located by feeling along the top surface of the gear with a wire or gem clip.

7. Type wheel shaft at type wheel hub - oil sparingly.

F. Ribbon Feed Mechanism

1. Ribbon feed arm (vertical) - oil pivot, grease upper and lower contact points.
2. Ribbon feed pawl arm (horizontal) - pivot.
3. Ribbon feed pawl - oil pivot; grease points of contact with ribbon reverse lever, detent stud, and retaining pawl shift stud.
4. Ribbon feed reverse lever - oil pivot; grease reverse engagement points and detent.
5. Ribbon feed ratchets - grease all teeth.
6. Ribbon feed ratchet bearing - saturate felt washer.
7. Ribbon feed ratchet friction spring - grease.

G. Platen Carriage mechanism

1. Spacing pawl - oil yield spring and bushing; grease guide slot and cut-out stud.
2. Spacing pawl latch - oil pivot; grease latch point.
3. Spacing shaft (assem.) - oil 2 bearings and saturate felt washers; grease teeth on spacing ratchet, spacing gear and spacing rack.
4. Space retaining pawl - oil pivot; grease point of contact with carriage return lever.
5. Carriage return lever - oil pivot; grease latch shoulder.
6. Carriage return lever latch - oil pivot; grease latch point.
7. Carriage return release lever; oil pivot slot; grease tip end and point of contact with carriage return release plunger.
8. Carriage return release plunger bearings.
9. Dashpot lever - oil pivot; grease points of contact with piston and carriage stop extension.
10. Dashpot piston rod - one drop oil rubbed over surface of piston rod.
11. Carriage return spring - oil thoroughly when assembling; oil through 3 holes in spring drum for subsequent lubrication.
12. Carriage return spring drum - saturate felt oil washer on hub and oil end of hub at nut.
13. Platen carriage.
  - (a) Carriage support - tracks and ball bearings.
  - (b) Platen roll bearings - 2 bearings.
  - (c) Pressure roll assembly - 4 roller shaft bearings, 2 release shaft bearings, 1 release lever cam surface, and 2 assembly guide pins.
  - (d) Platen crank handle bushing.
  - (e) Platen crank shaft - grease sparingly.
  - (f) Right-hand margin and carriage return adjusting screw heads - grease.

H. Gears - grease.

Motor gear, main shaft gears - (2), type wheel shaft gear, front shaft gear.

J. Motor - grease, using 8C975 grease gun or apply 10 to 20 drops of oil.

K. Margin Bell Assembly - 2 pivot points, lower surface of margin bell adjusting bracket.

L. Springs - oil both loops of all helical springs that exert a nominal tension of less than 2-1/2 pounds. Apply grease to both loops of all helical springs that exert a nominal tension of 2-1/2 pounds or more.

2. Keyboard and Base Unit

A. Lubrication on bottom side of keyboard

1. Code bars - in slots and rollers.
2. Universal bar pilot screw - bearings.
3. Trip-off pawl link - joint.
4. Key levers - on key lever shaft and in rear comb.
5. Locking levers - between pins in code bars.

B. Lubrication on top side of keyboard.

1. Key levers - in front comb.
  2. Space bar loop - on space bar loop shaft.
  3. Keyboard shaft - 2 oil cups.
  4. Keyboard clutch - sliding member.
  5. Cams - surfaces of all six.
  6. Locking loop pilot screw - bearings and roller.
  7. Contact lever pivoting shaft and guiding comb.
  8. Locking levers in locking lever comb.
  9. Clutch throw-out lever - bearings.
  10. Trip-Off and clutch lever pawls.
  11. Keyboard gear - grease.
  12. Idler gears - 3 holes in upper gear plate.
  13. Repeat space rod - at bearing points and points of contacts.
- C. Springs - oil both loops of all helical springs that exert a nominal tension of less than 2-1/2 pounds. Apply grease to both loops of all helical springs that exert a nominal tension of 2-1/2 pounds or more.

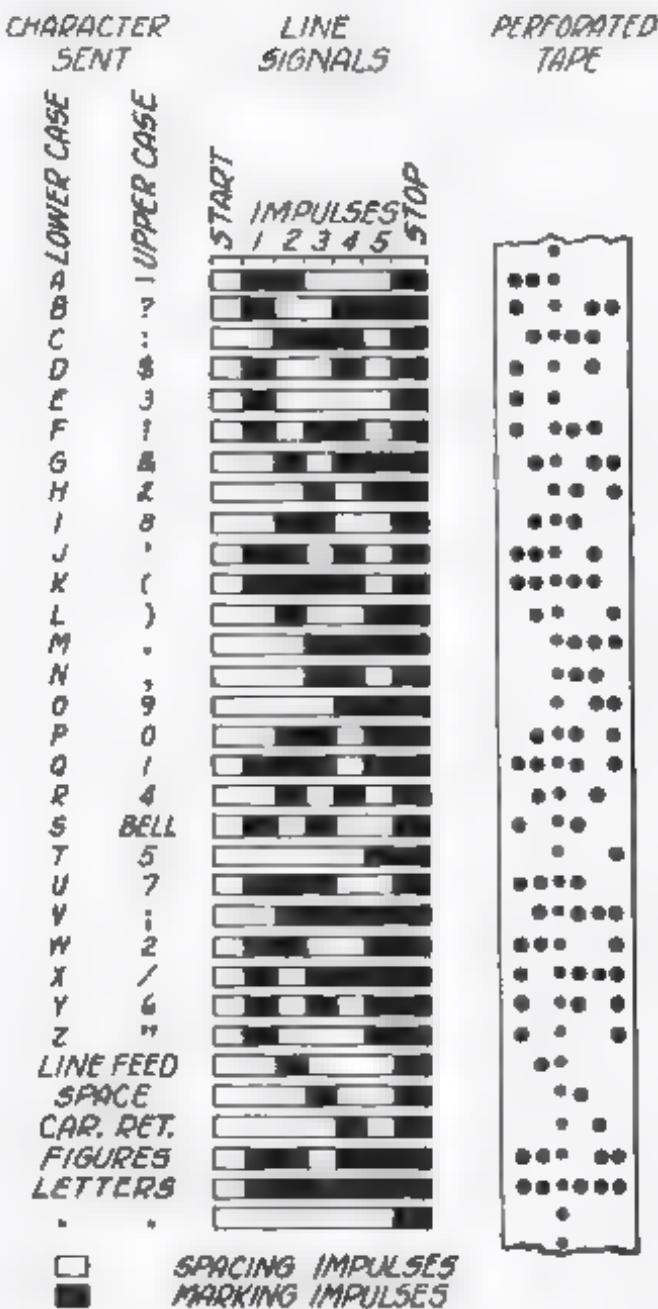


FIGURE 1



FIGURE 2

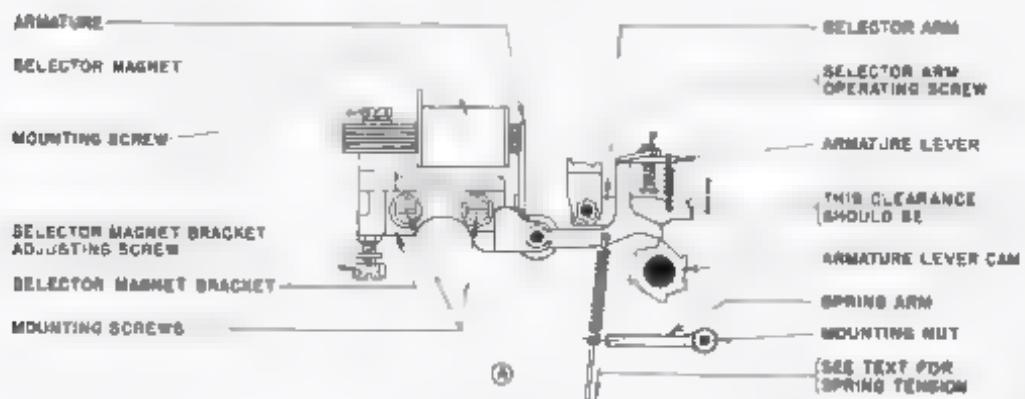


FIGURE 3

SELECTOR ARM STOP DETENT  
STOP DETENT ECCENTRIC POST  
SELECTOR ARM OPERATING SCREW  
PIVOT SCREW  
LOCK NUT  
BARELY PERCEP BLE END PLAY  
SELECTOR ARM  
LOCKING WEDGE  
LOCKING LEVER  
EQUAL CLEARANCE  
LOCKING LEVER GUIDE



FIGURE 4

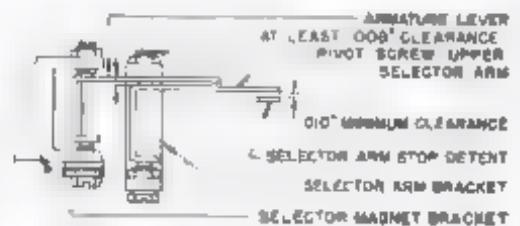


FIGURE 5

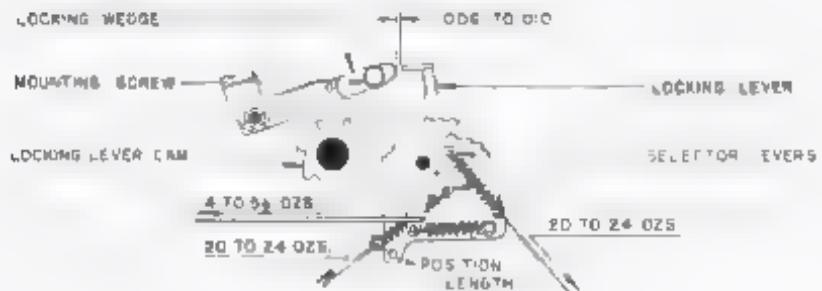


FIGURE 6



FIGURE 7

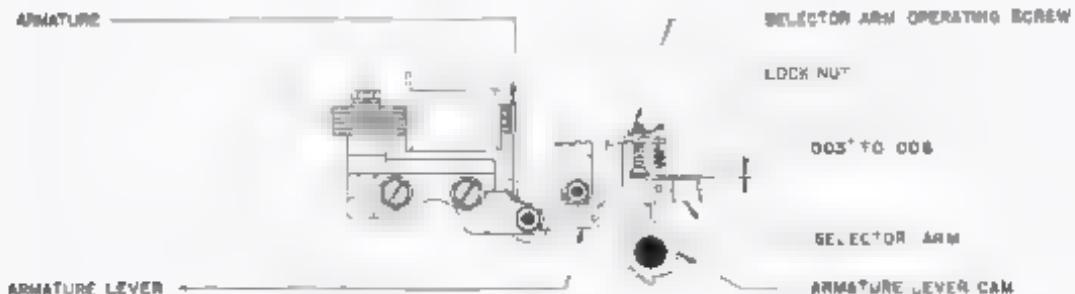


FIGURE 8

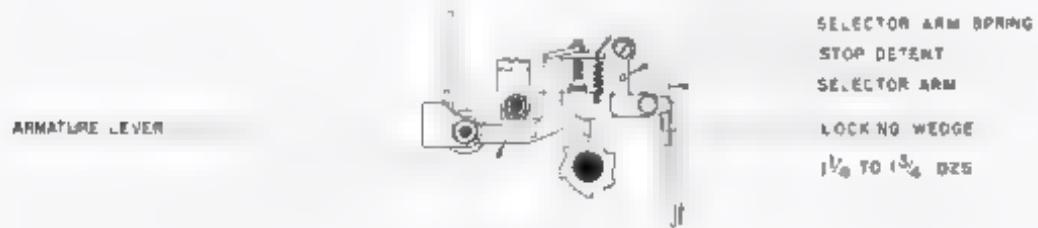


FIGURE 9

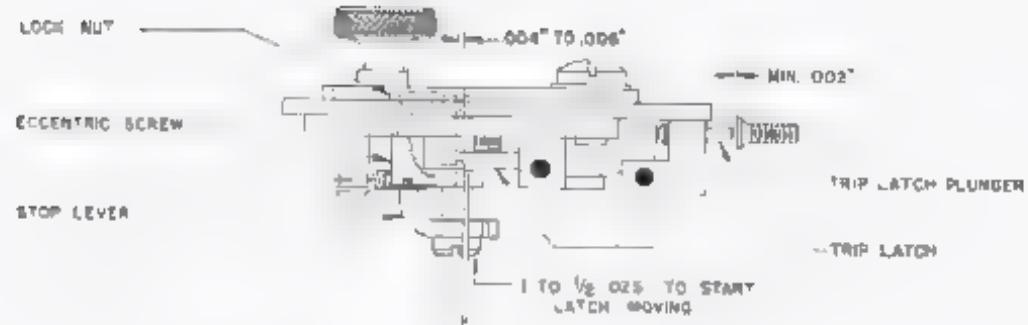


FIGURE 10

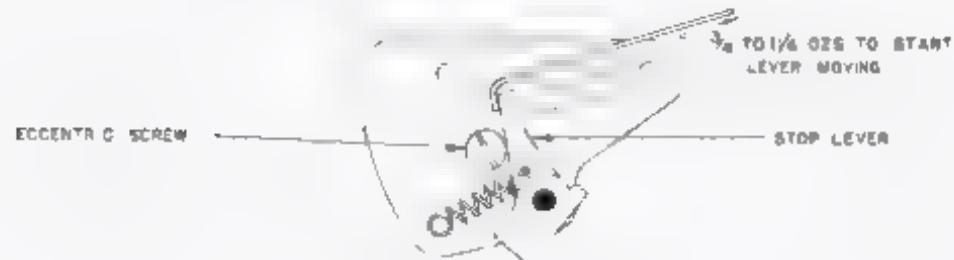


FIGURE 11

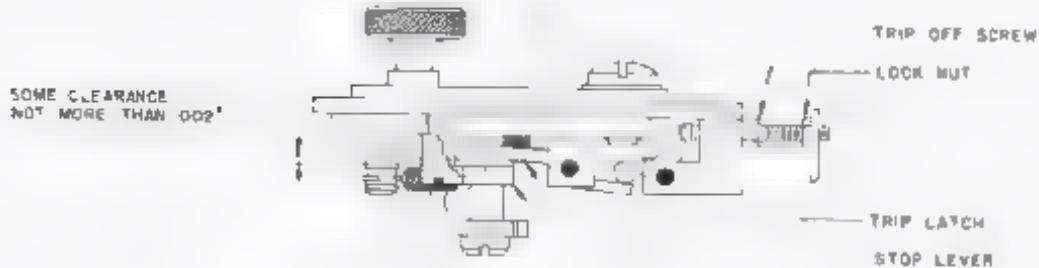


FIGURE 12

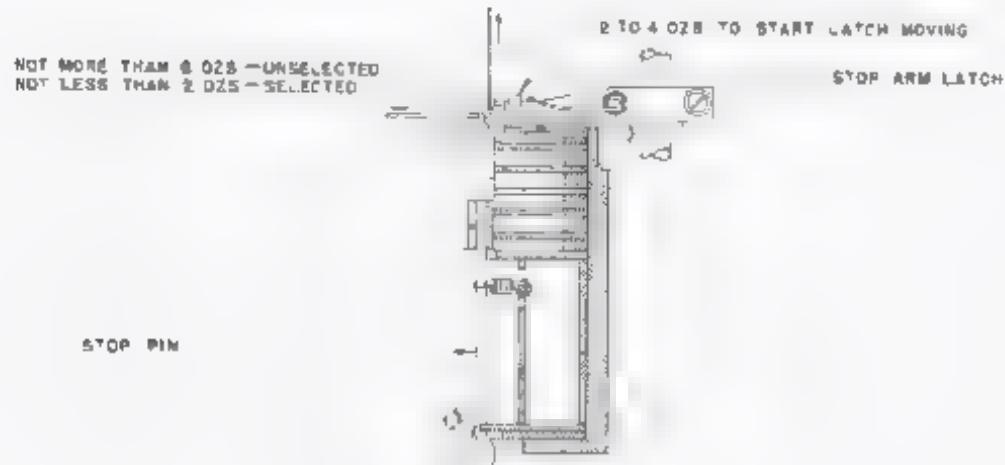


FIGURE 13

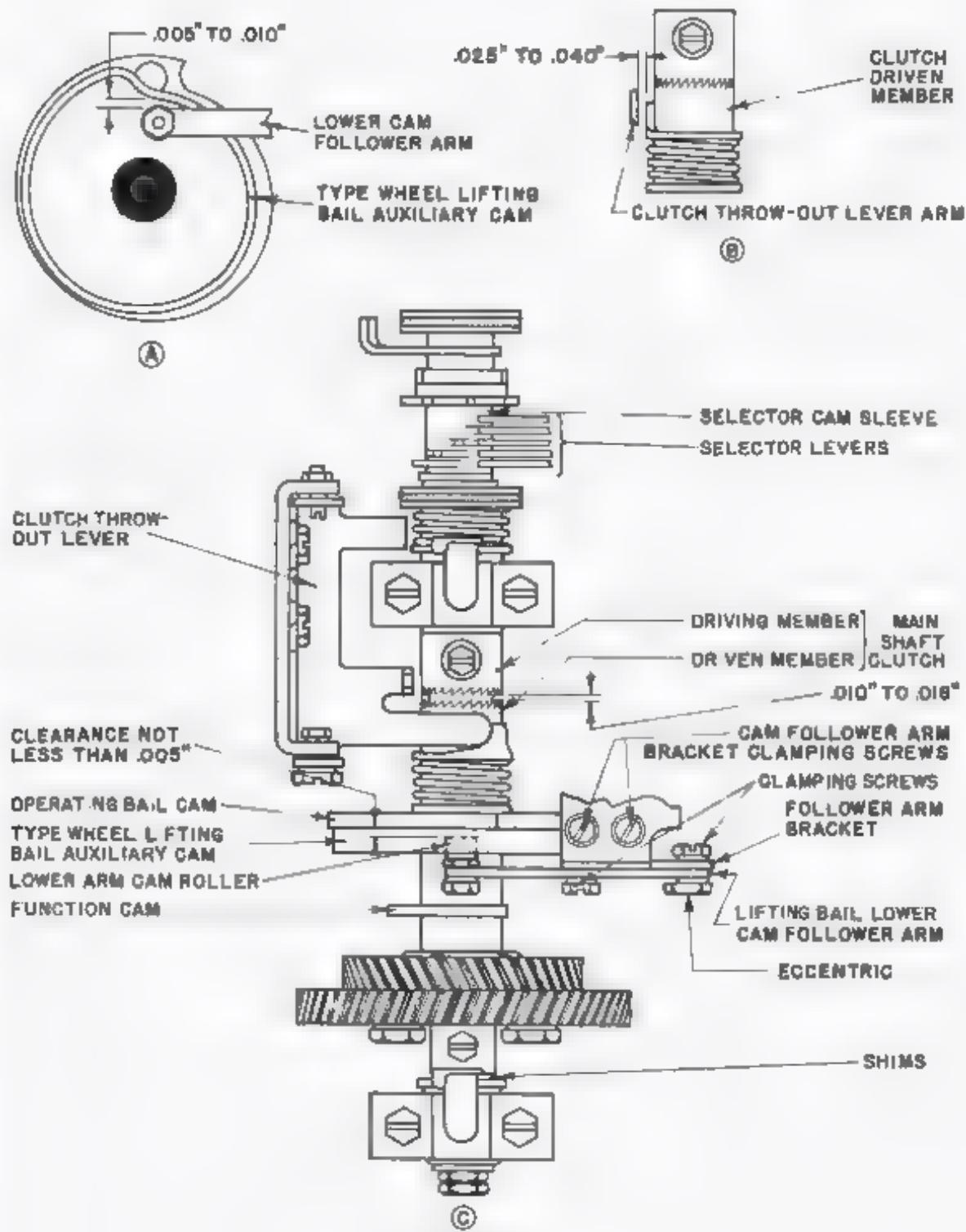


FIGURE 14

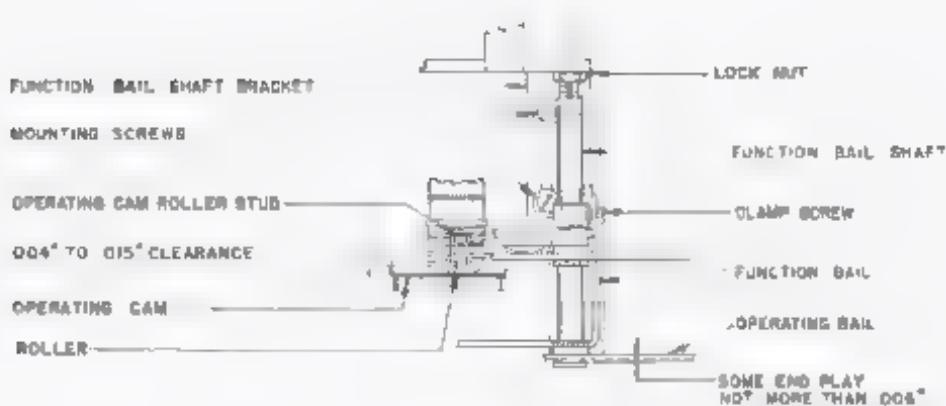


FIGURE 15

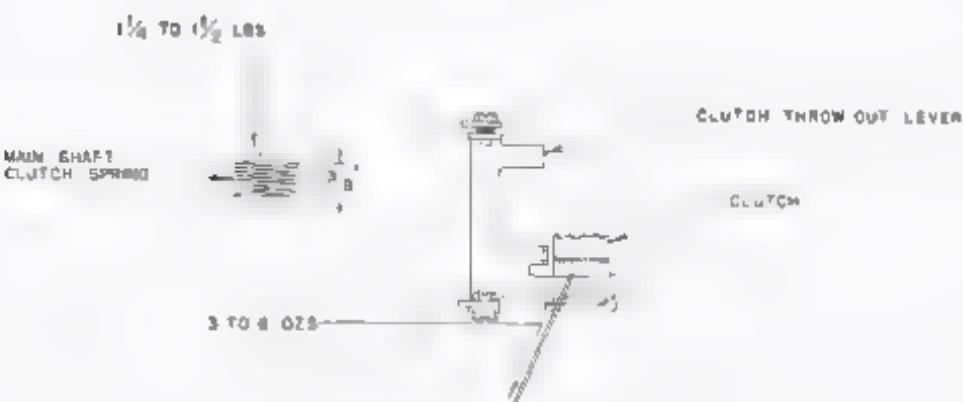


FIGURE 16

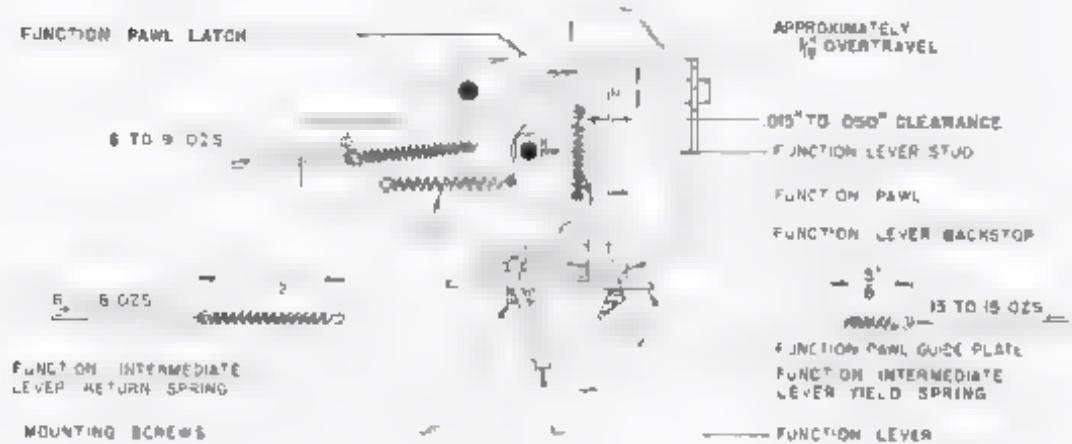


FIGURE 17

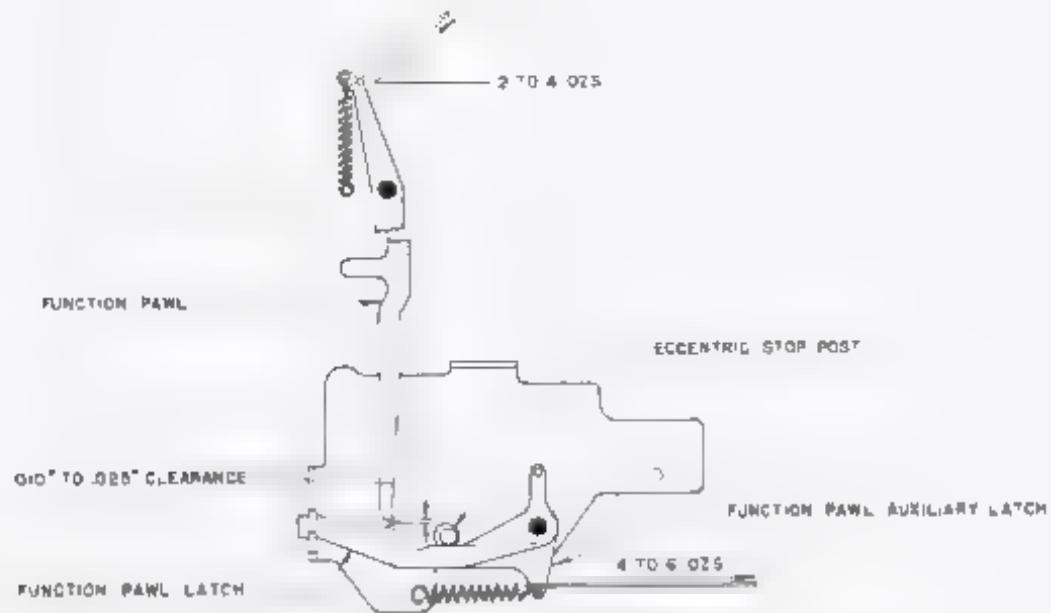


FIGURE 18

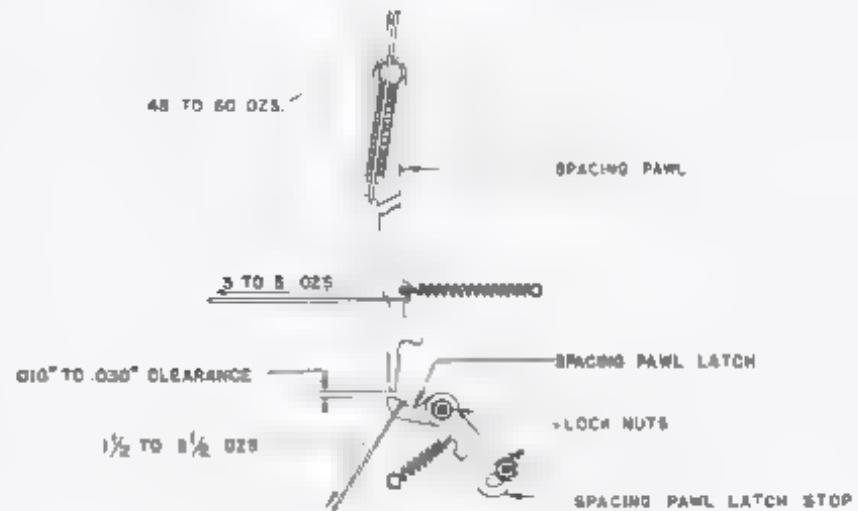


FIGURE 19

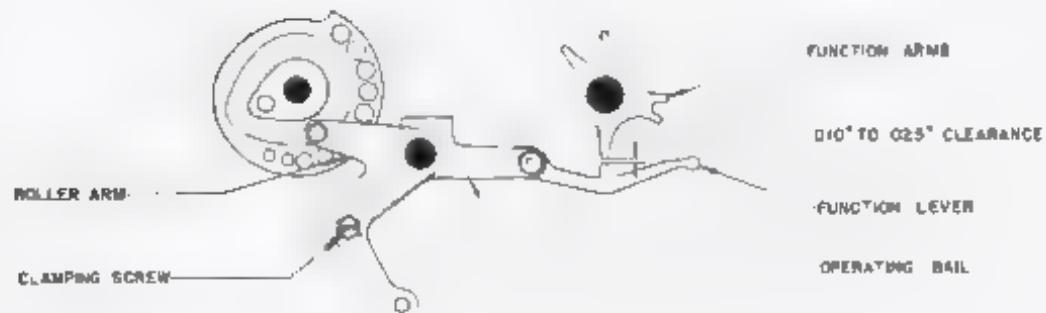


FIGURE 20

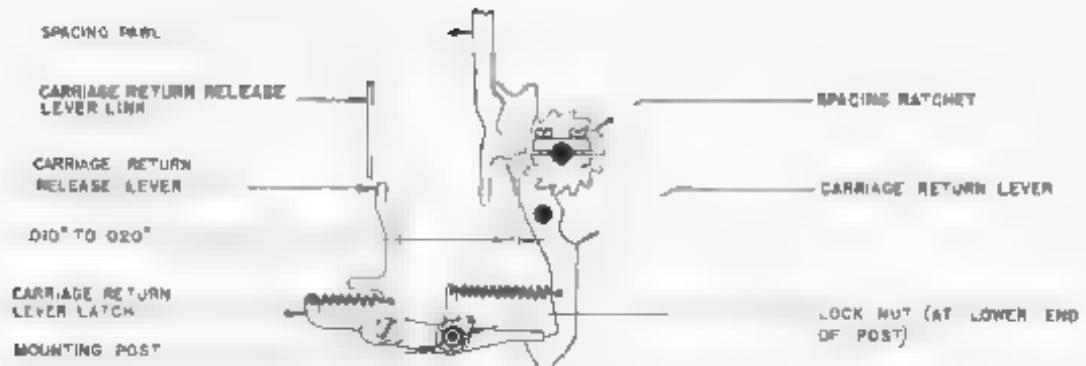


FIGURE 21

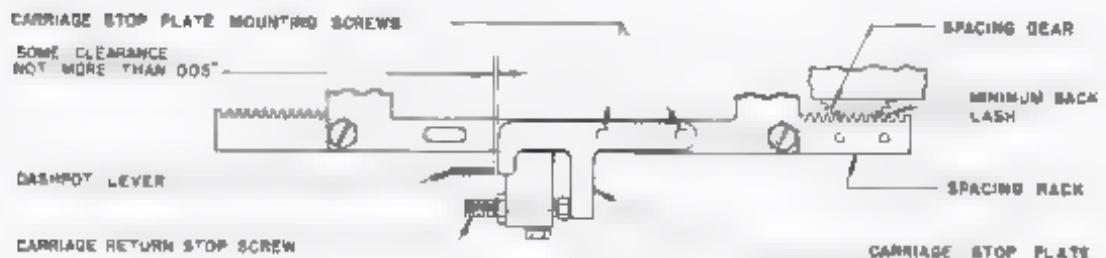


FIGURE 22

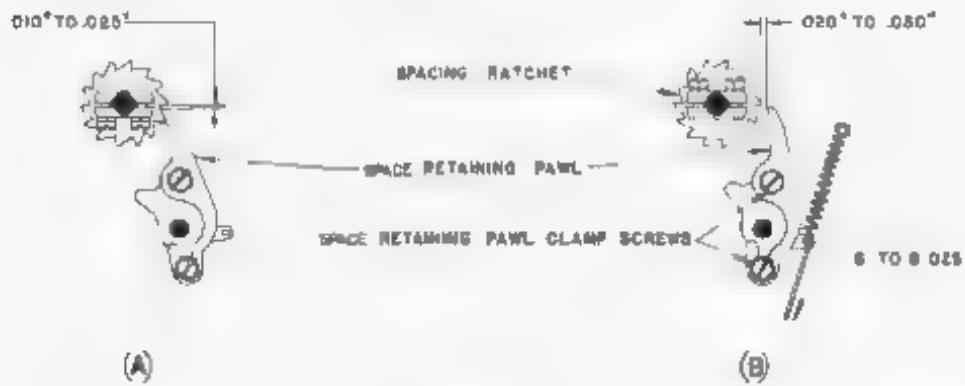


FIGURE 23

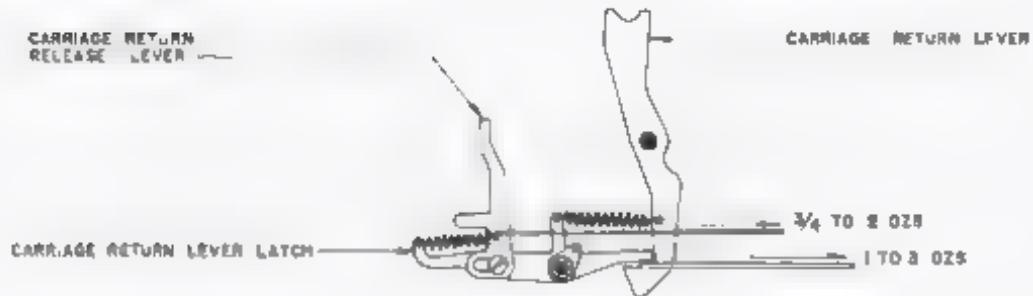


FIGURE 24

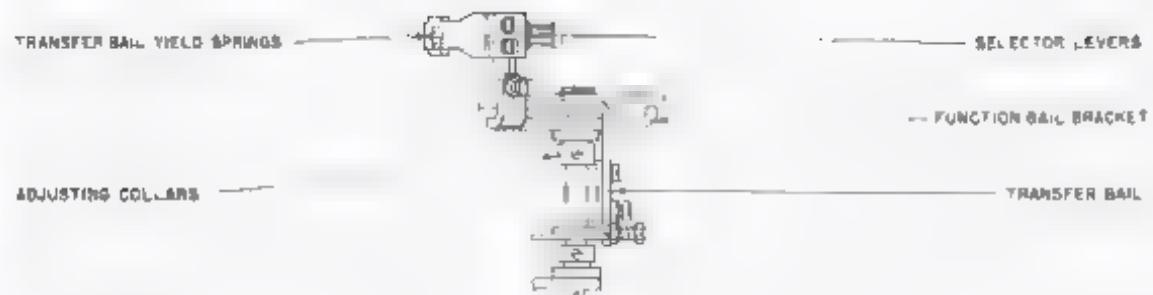


FIGURE 25

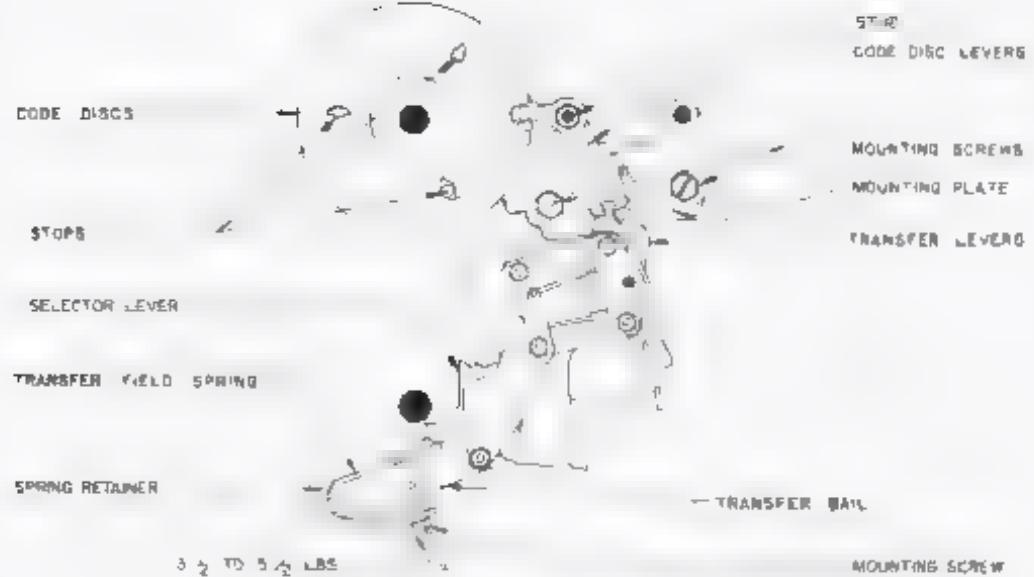
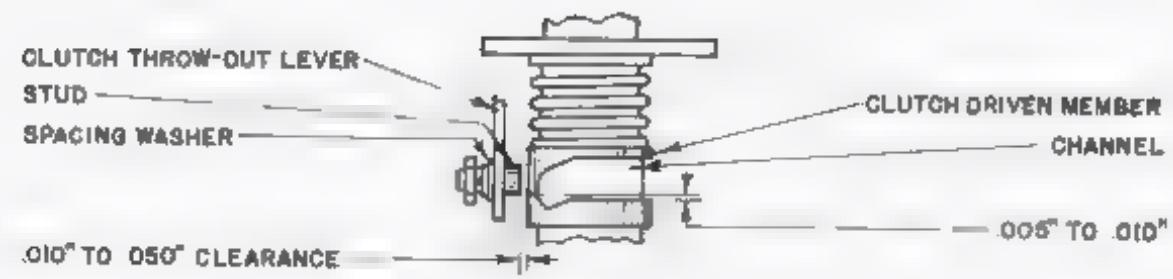
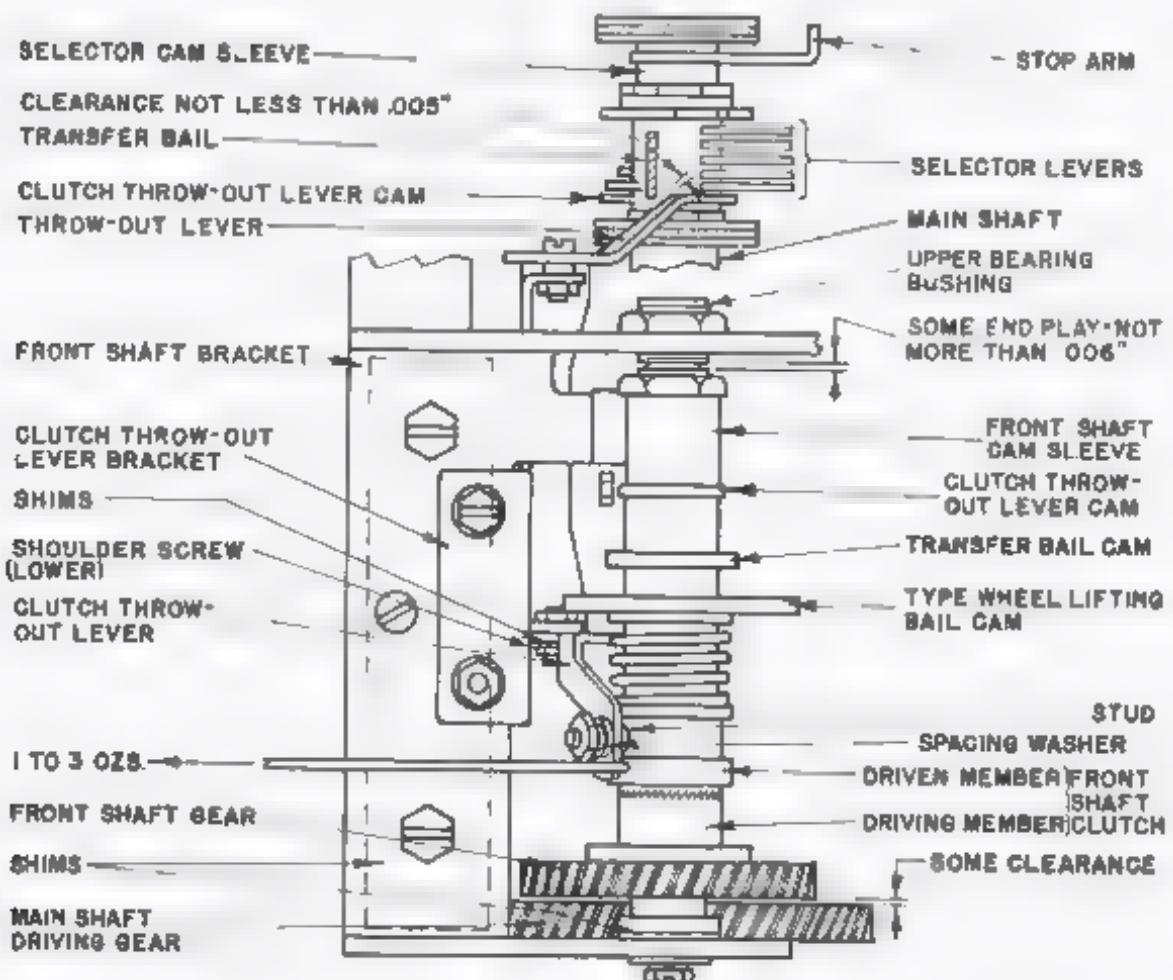


FIGURE 26



(A)



(B)

FIGURE 27

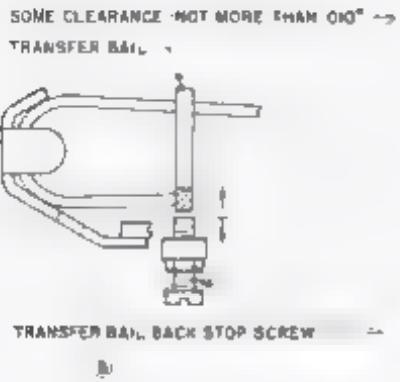
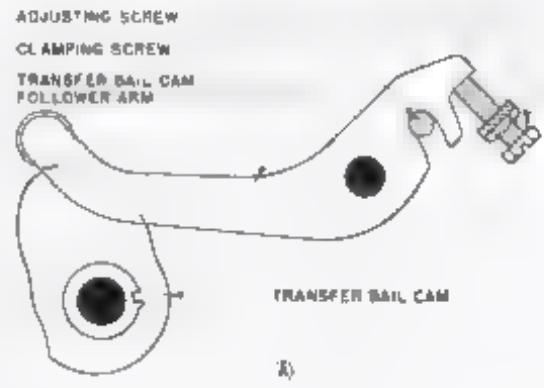


FIGURE 28

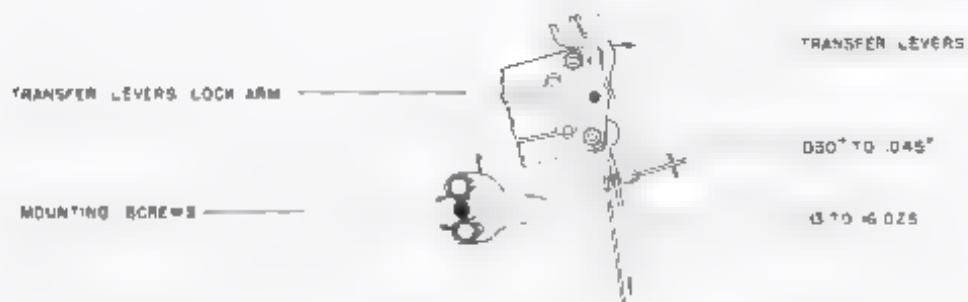


FIGURE 29

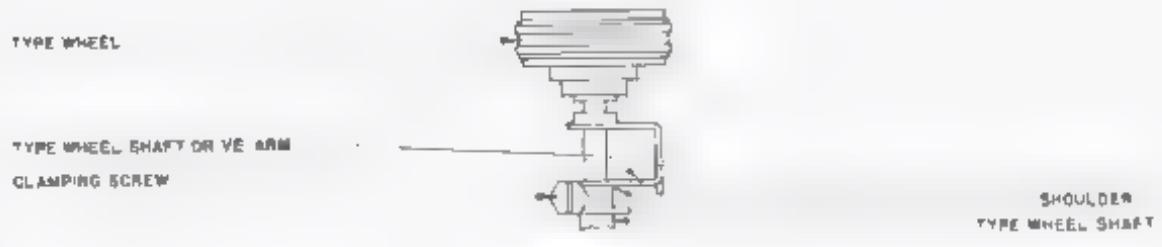


FIGURE 30

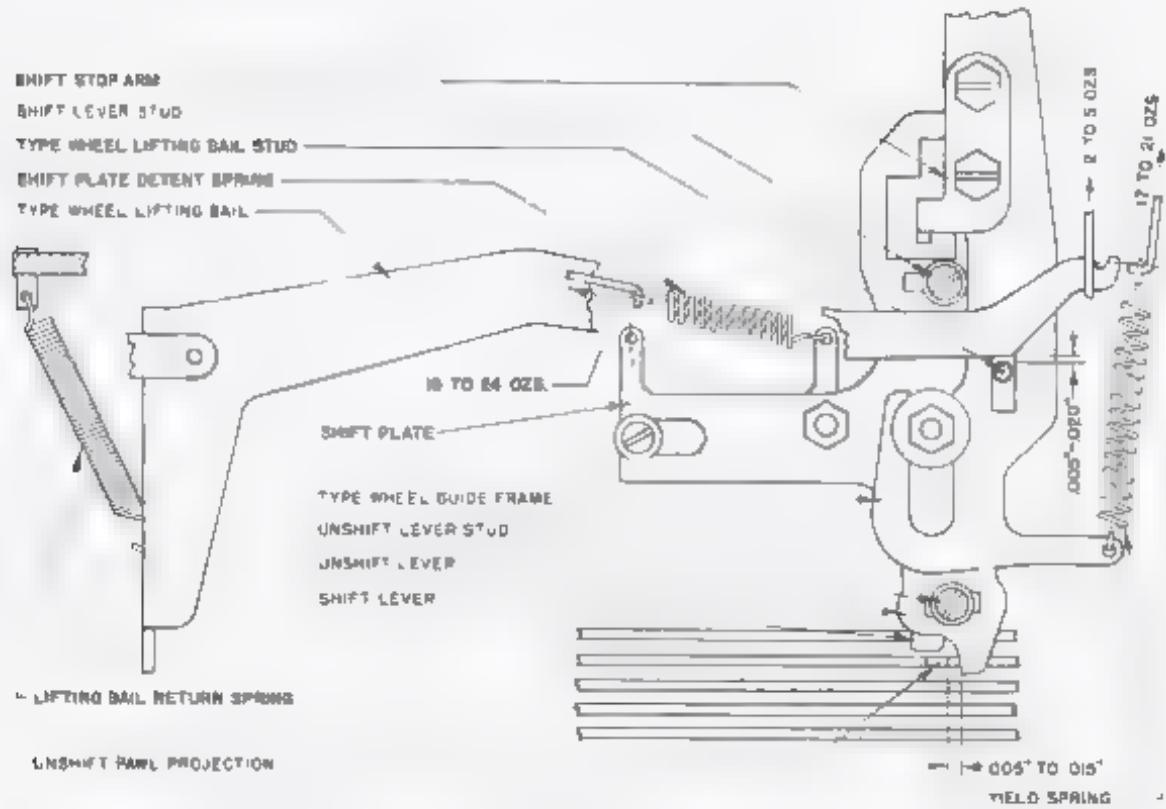
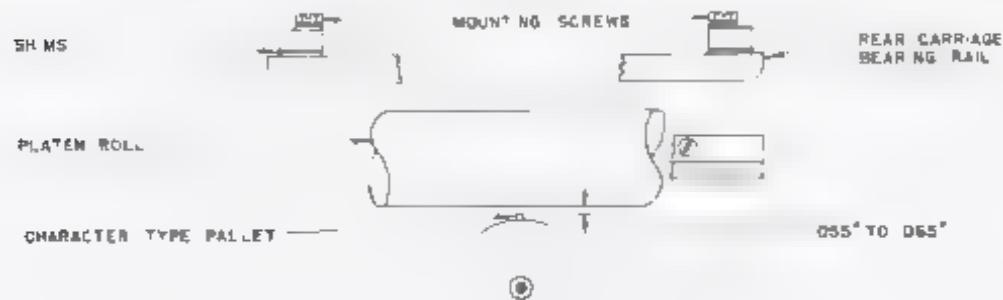


FIGURE 31



**FIGURE 32**



**FIGURE 33**

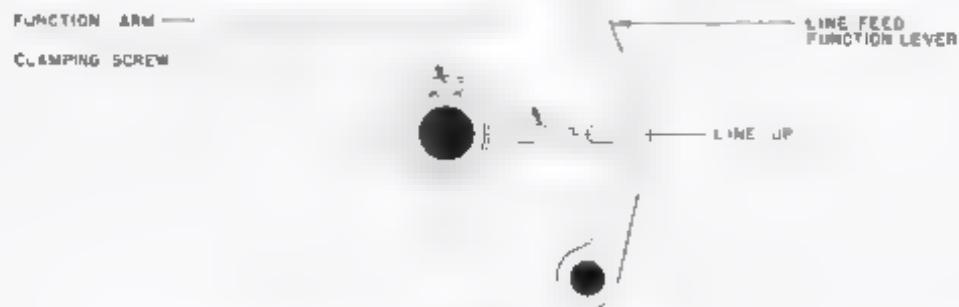


FIGURE 34

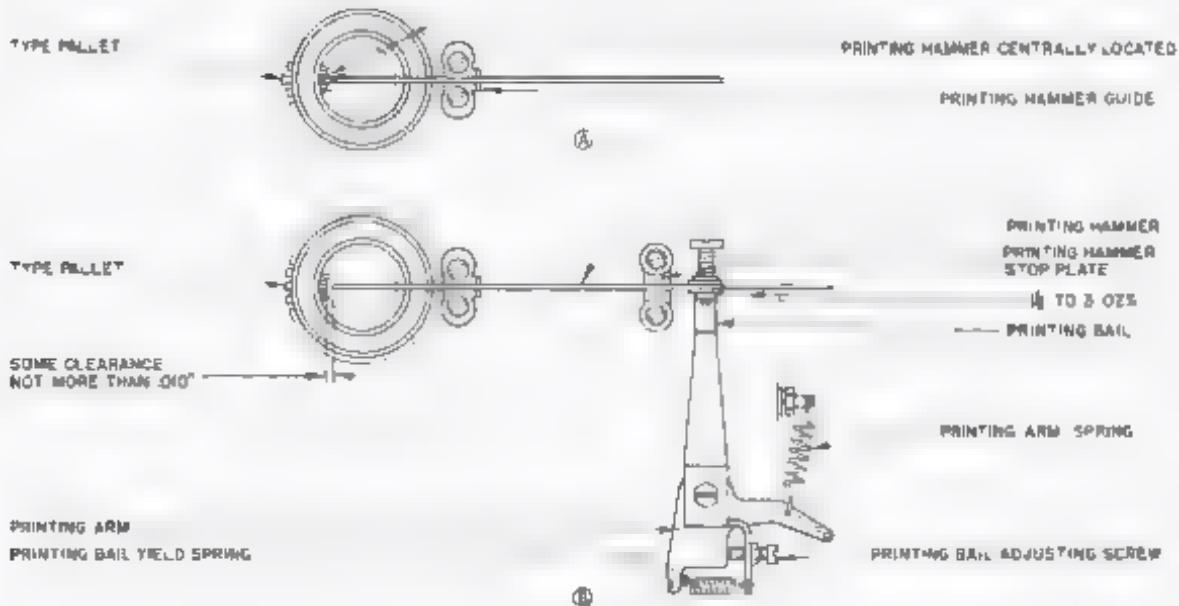


FIGURE 35



FIGURE 36

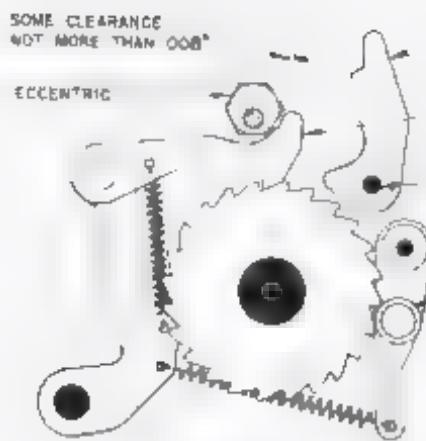


FIGURE 37

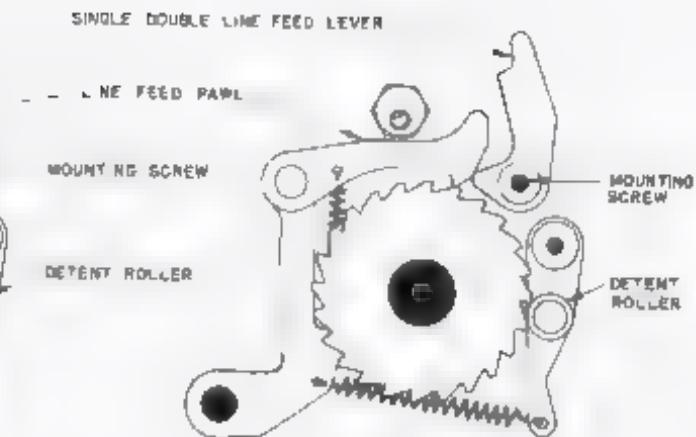


FIGURE 38

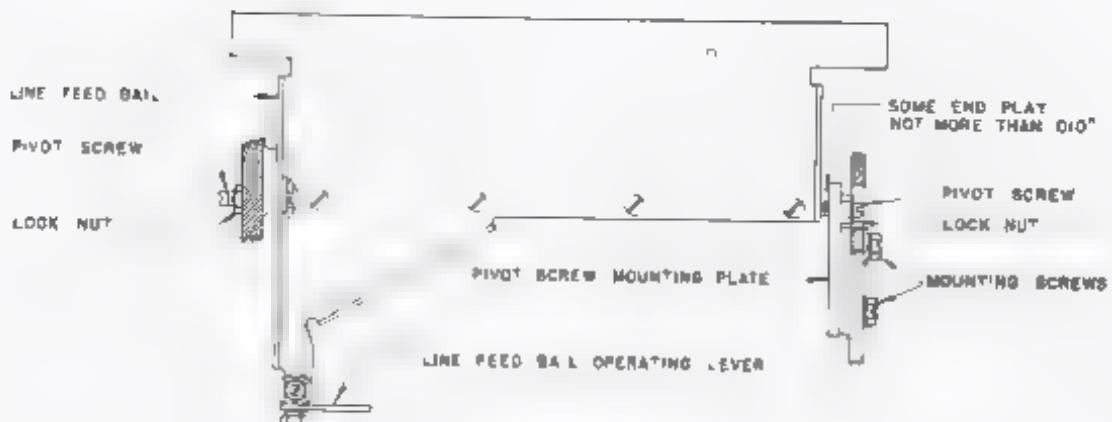


FIGURE 39

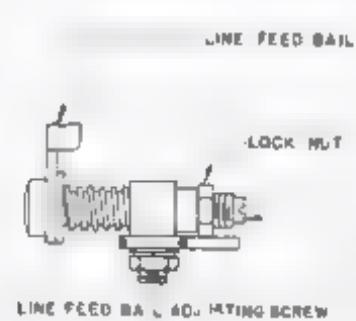
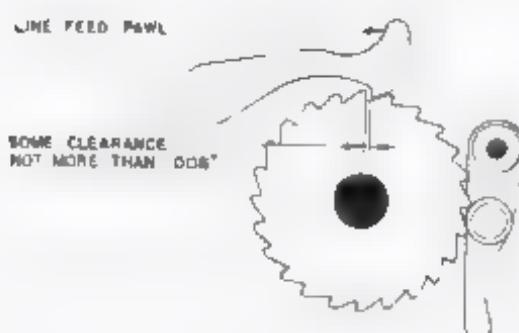


FIGURE 40

4 TO 6 .025

ECCENTRIC BACK STOP

LINE FEED PAWL

LINE FEED RATCHET

LINE FEED DETENT LEVER

20 TO 28 .025

FIGURE 41

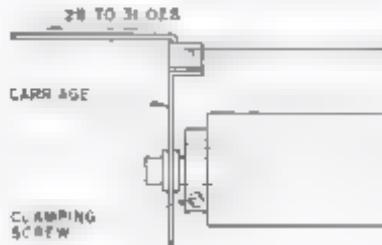


FIGURE 42

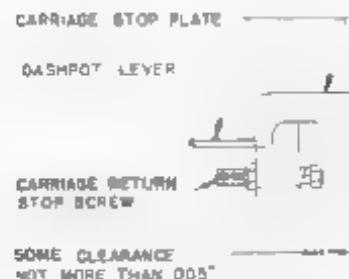
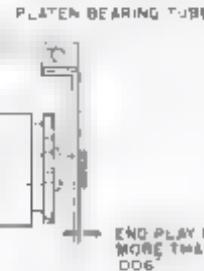


FIGURE 43

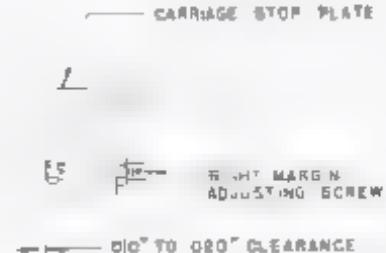


FIGURE 44

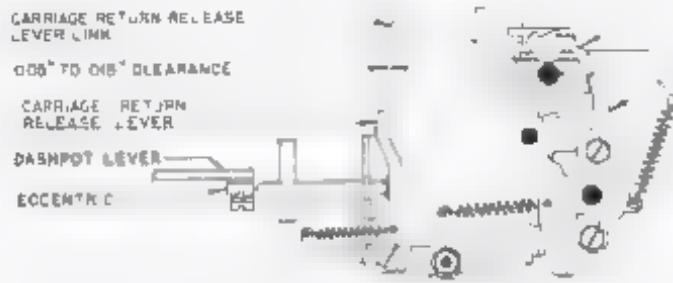


FIGURE 45



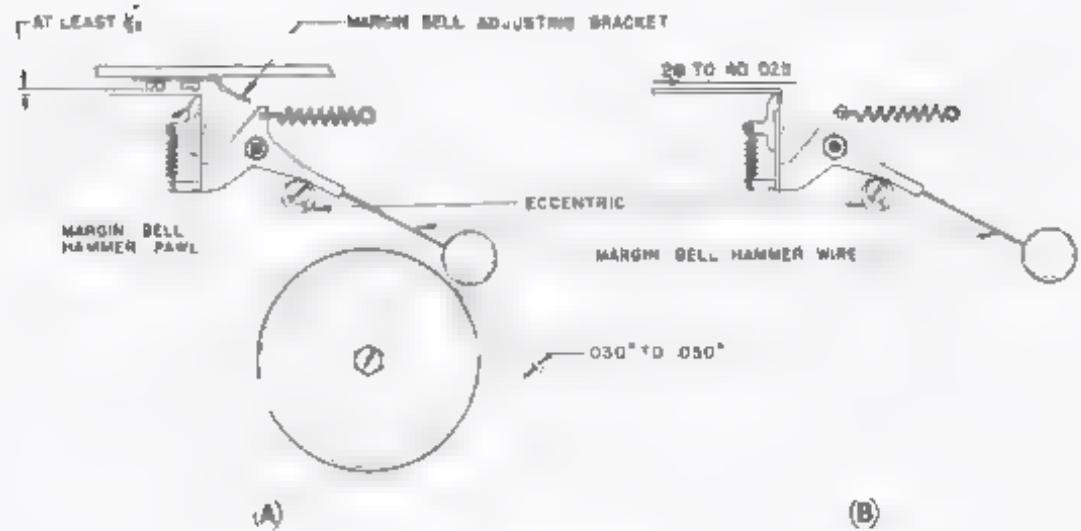


FIGURE 46



FIGURE 47

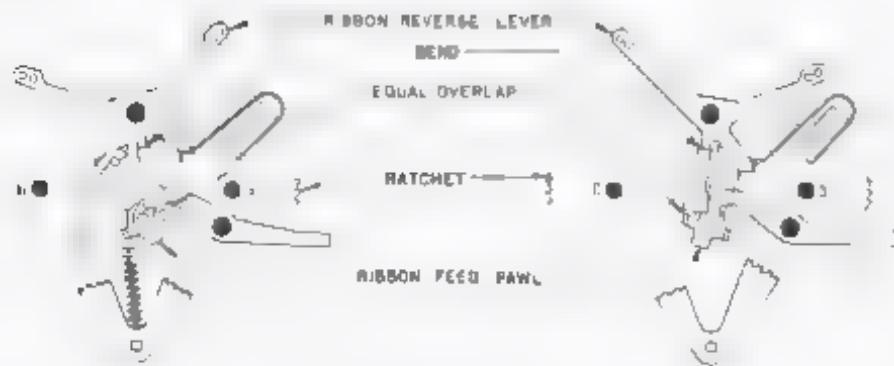


FIGURE 48

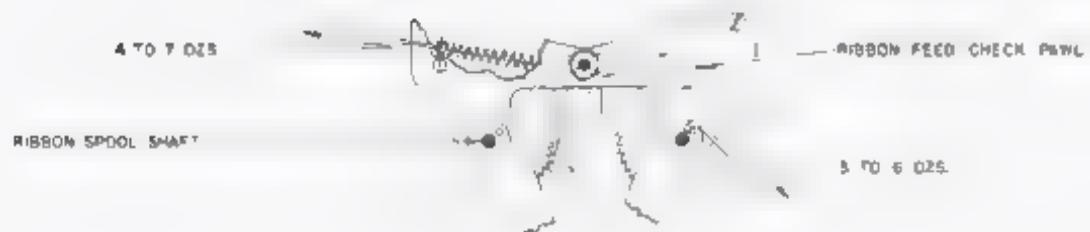


FIGURE 49



FIGURE 50



FIGURE 51

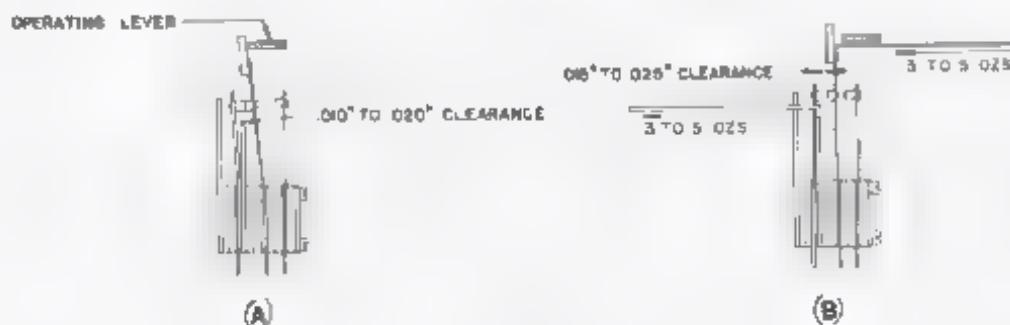


FIGURE 52

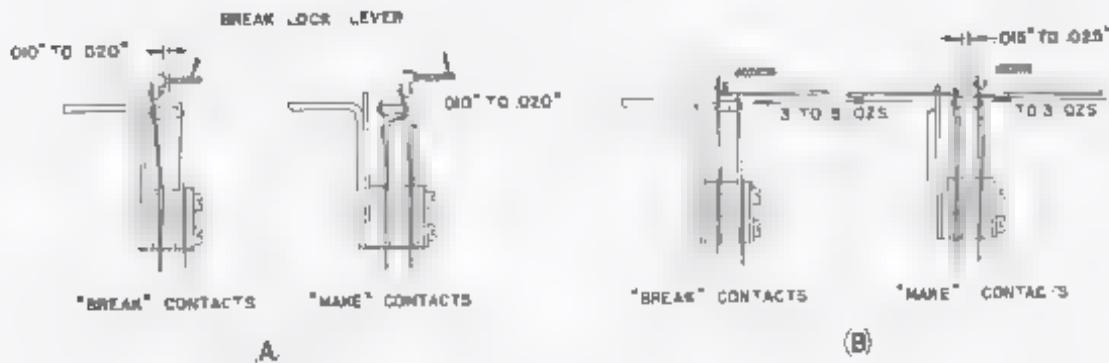


FIGURE 53

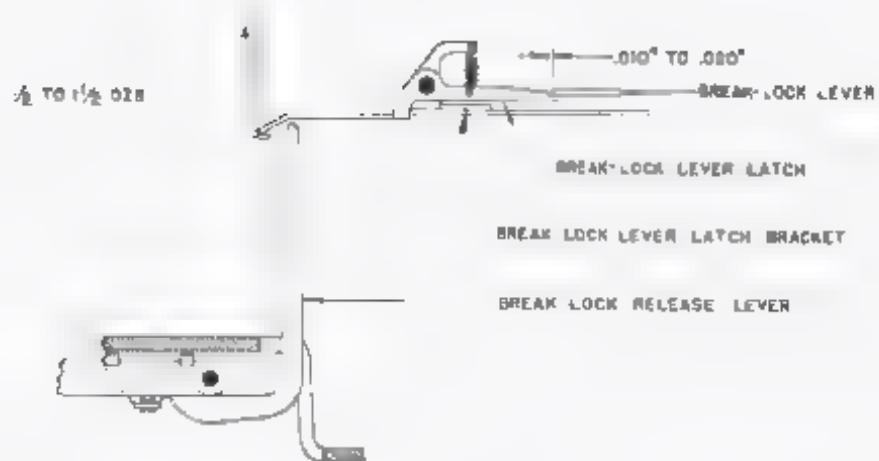


FIGURE 54



FIGURE 55

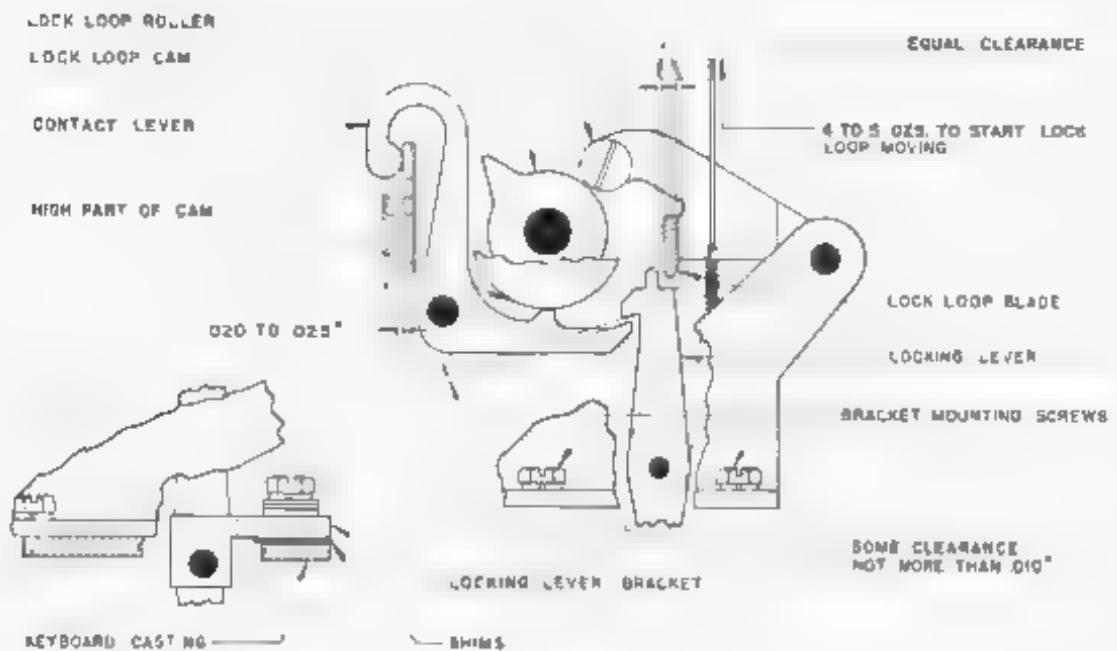


FIGURE 56

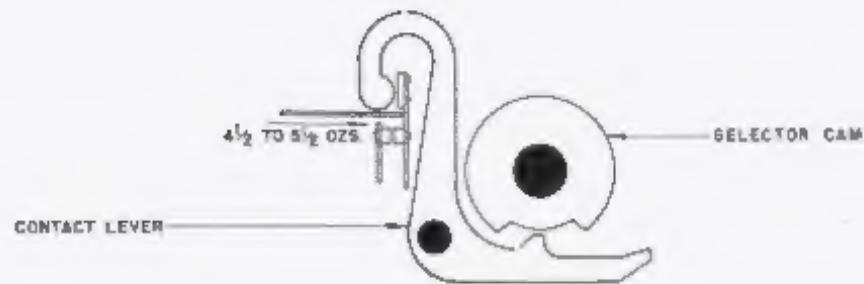


FIGURE 57

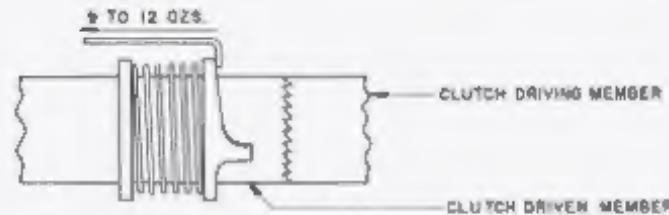


FIGURE 58

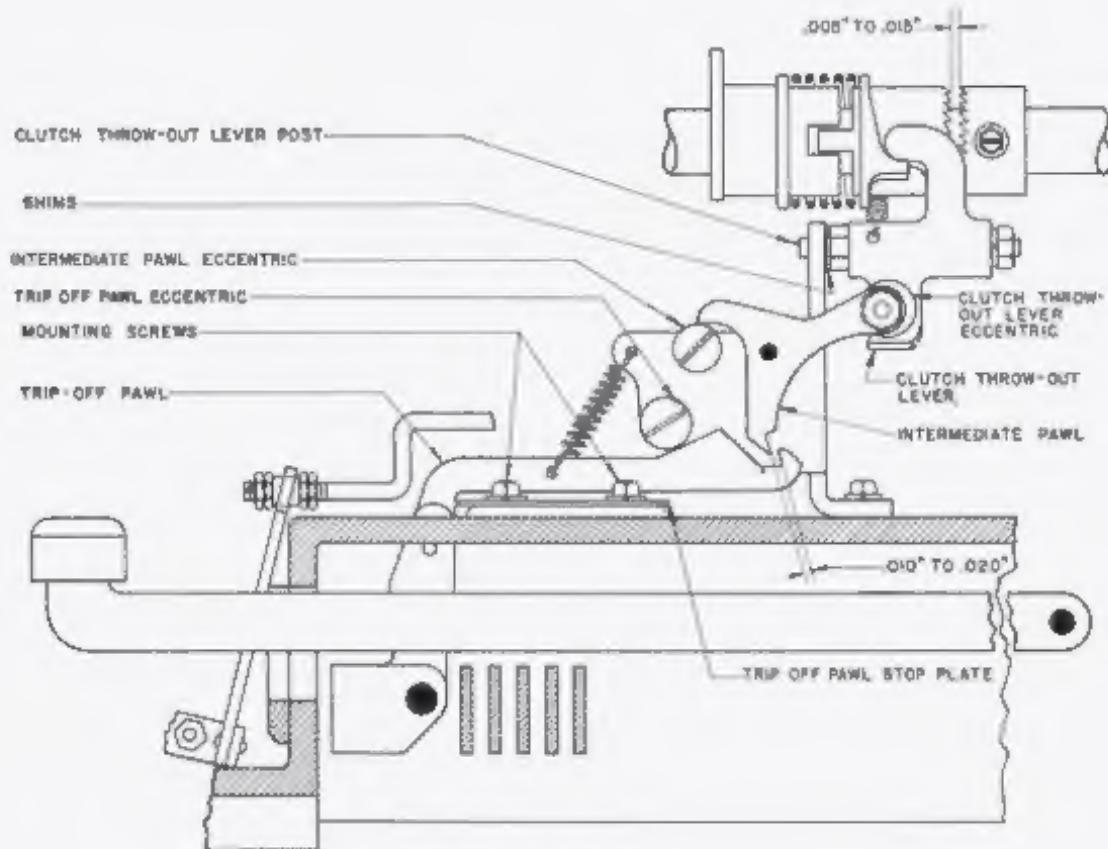


FIGURE 59

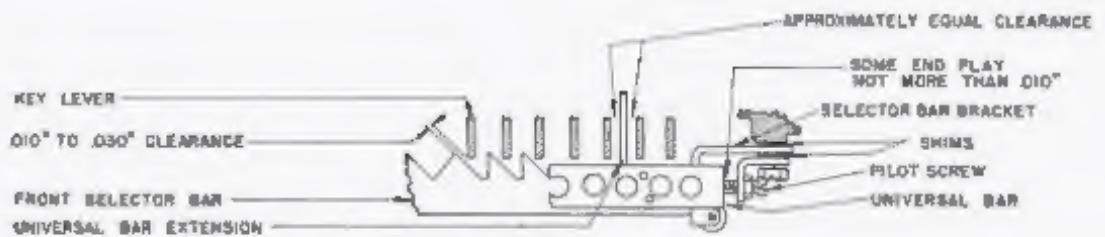


FIGURE 60

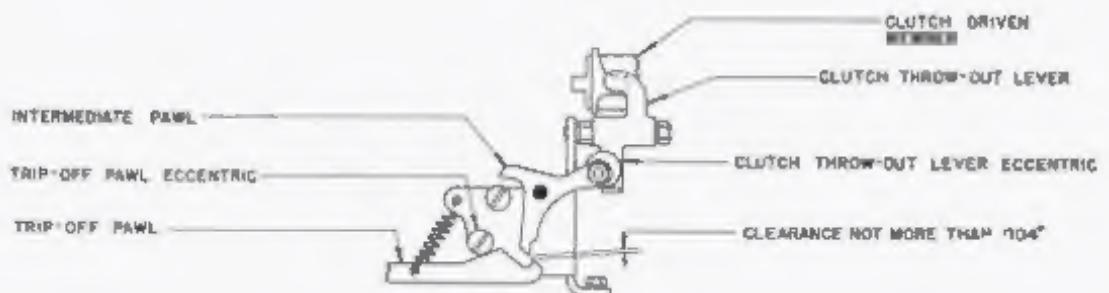


FIGURE 61

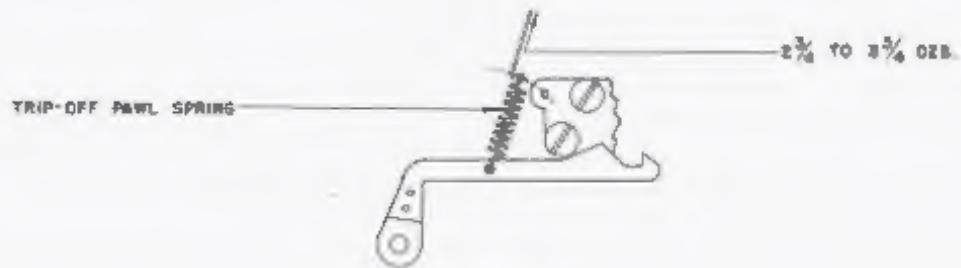


FIGURE 62

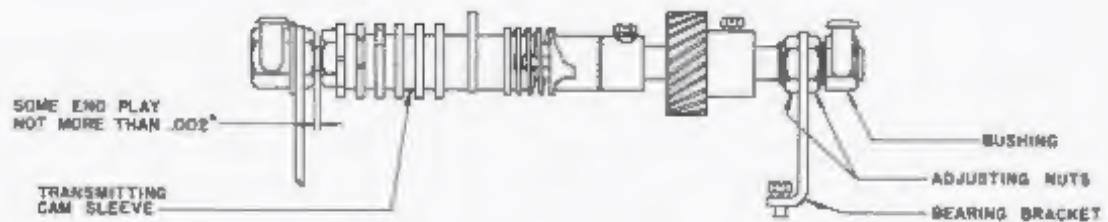


FIGURE 63

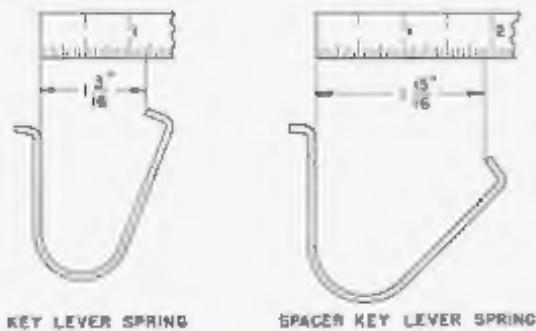


FIGURE 64

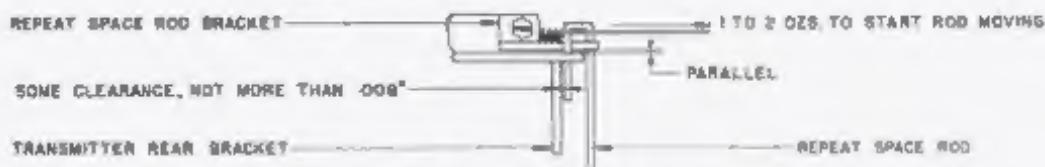


FIGURE 65

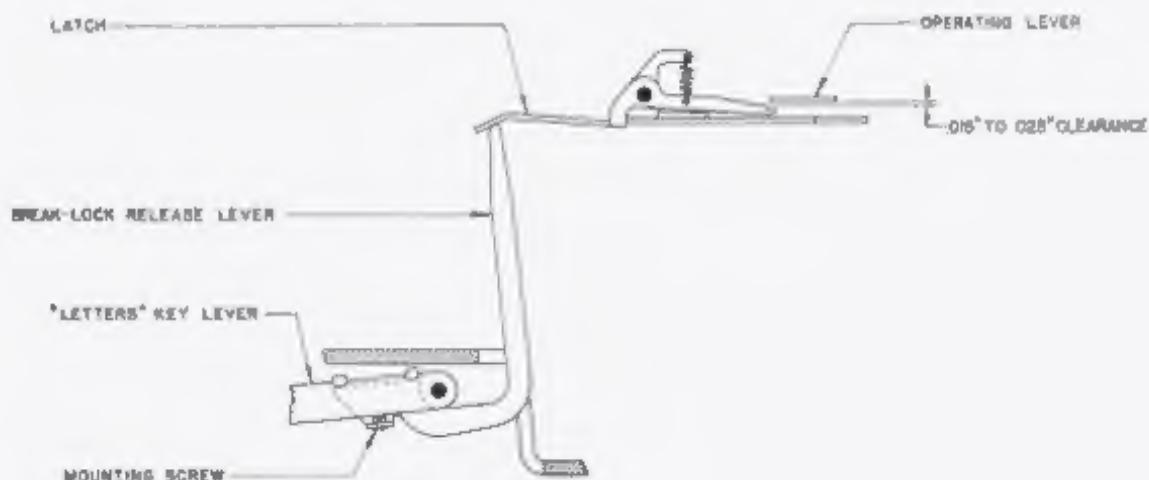


FIGURE 66

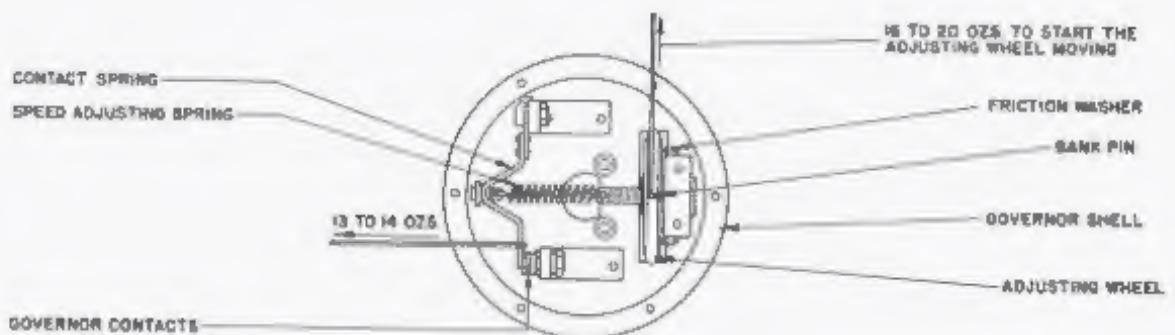


FIGURE 67

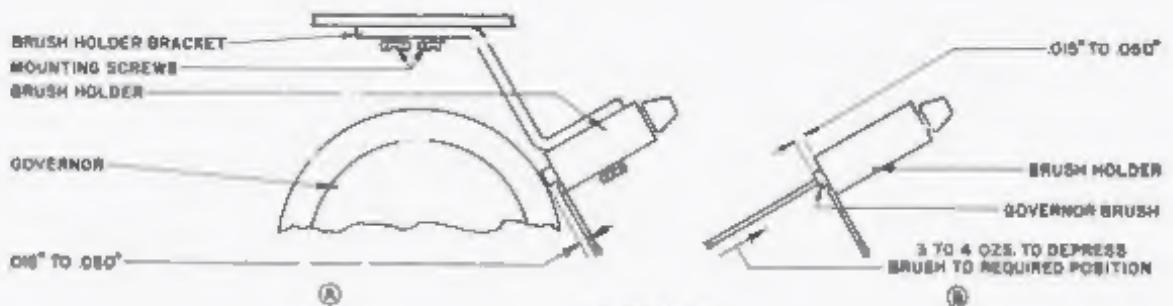


FIGURE 68

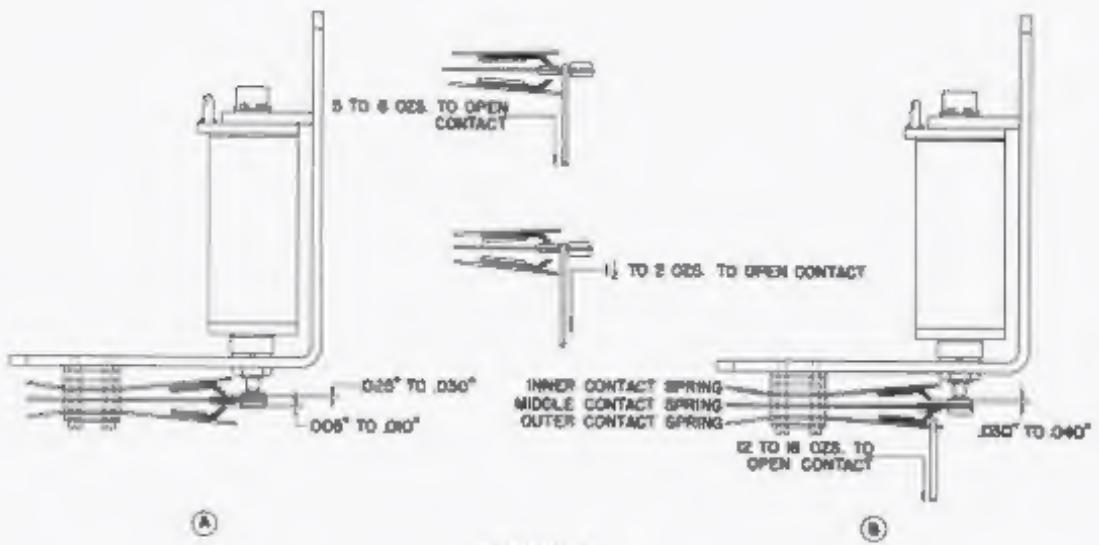


FIGURE 69